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Changes in physical activity and sedentary behaviours from before to during the COVID-19 pandemic lockdown: a systematic review

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ABSTRACT

Objective In March 2020, several countries banned unnecessary outdoor activities during COVID-19, commonly called 'lockdowns. These lockdowns have the potential to impact associated levels of physical activity and sedentary behaviour. Given the numerous health outcomes associated with physical activity and sedentary behaviour, the aim of this review was to summarise literature that investigated differences in physical activity and sedentary behaviour before vs during the COVID-19 lockdown.

Design, data sources and eligibility criteria Electronic databases were searched from November 2019 to October 2020 using terms and synonyms relating to physical activity, sedentary behaviour and COVID-19. The coprimary outcomes were changes in physical activity and/or sedentary behaviour captured via device-based measures or self-report tools. Risk of bias was measured using the Newcastle-Ottawa Scale.

Results Sixty six articles met the inclusion criteria and were included in the review (total n=86 981). Changes in physical activity were reported in 64 studies, with the majority of studies reporting decreases in physical activity and increases in sedentary behaviours during their respective lockdowns across several populations, including children and patients with a variety of medical conditions.

Conclusion Given the numerous physical and mental benefits of increased physical activity and decreased sedentary behaviour, public health strategies should include the creation and implementation of interventions that promote safe physical activity and reduce sedentary behaviour should other lockdowns occur.

Summary box

What is already known?

- COVID-19-related lockdowns have affected people's physical activity (PA) and sedentary behaviour (SB).

What are the new findings?

- The majority of studies show that PA levels decreased during the COVID-19 lockdown across all reviewed populations, except for eating disorder patients.
- The majority of studies show that SB levels increased.
- Public health strategies should include the promotion of PA and effective guidance on how to decrease SB during a lockdown, especially in populations with medical conditions that are improved by PA, such as type 1 and type 2 diabetes.

INTRODUCTION

In March 2020, WHO declared the COVID-19 outbreak a global pandemic, and as of 26 October 2020, over 42 000 000 confirmed cases have been diagnosed in more than 130 countries and territories, resulting in approximately 1 150 000 deaths.[1] COVID-19 has led to over 100 countries enforcing social distancing to reduce the rate of COVID-19 transmission, commonly called 'lockdown'.[2] The severity of lockdown has varied from country to country, even region to region, with some countries limiting the distance people could travel from their homes, and some banning any unnecessary outdoor activity.[2] These lockdowns have impacted people's work, education, travel and recreation, and subsequent levels of physical activity (PA) and sedentary behaviours (SB).[3]

PA can be defined as any bodily movement produced by skeletal muscle that results in energy expenditure,[4] and can include exercising, walking, gardening and doing household chores. Research shows that PA is positively associated with several desirable outcomes, including social contentedness,[5] physical health[6] and mental health.[7 8] Specific to COVID-19, PA has been shown to improve physical and mental health and has been suggested to provide protective elements against COVID-19.[9–11] Furthermore, it has been reported that the COVID-19 lockdown yielded decreases in PA,[12] however, the literature has not been systematically reviewed to date.

SB can be defined as any waking behaviour with an energy expenditure of ≤1.5 Metabolic

Equivalents (METs) while in a sitting or reclining posture,[13] including watching TV, video gaming and computer use. The literature has shown SB to be negatively associated with physical, mental health and social outcomes.[14 15] Specific to COVID-19, it has been reported that periods of enforced quarantine can yield increases in SB,[9–13 16] however, this has not been systematically assessed to date in the context of the COVID-19 lockdown.

Understanding the changes in PA and SB behaviours during lockdown is important not only for health outcomes associated with these behaviours, but also for aiding development of public health interventions in specific populations (such as PA promotion and interventions to decrease SB) should another lockdown be enforced, a similar pandemic scenario and/or during the return to 'normal life'.[17] The aim of this study, therefore, was to conduct a comprehensive systematic review on changes in all reported PA and SB behaviours during versus before the COVID-19 pandemic lockdown, stratifying between adults and children, and special populations.

METHODS

The current systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.[18] Details of the full protocol for this systematic review were registered on PROSPERO (protocol number: CRD42020193065).

Search strategy

Electronic databases were searched from November 2019 to June 2020 including PubMed, EMBASE, PsycINFO, CINAHL, Social Science Citation Index, Cochrane Central Register of Controlled Trials, SPORTDiscus and Scopus. Grey literature was searched by entering terms into OpenGrey. Search terms were as follows:

COVID-19 OR "Novel Coronavirus" OR "2019 novel coronavirus" OR 2019-nCoV OR SARS-CoV-2

AND isolation OR lock* OR self-isolation

AND

"Physical activity" OR exercise OR walking OR running OR cycling OR swimming OR sports OR sedentary OR "sedentary behaviour" OR activity OR "screen time" OR sitting.

Full information on database-specific search strategies can be found in online supplemental table 1.

Results of the searches were included in a bibliographic database and duplicates removed. Titles and abstracts of the retrieved studies were screened for inclusion by two reviewers independently (SS and MT), and then the full text of all potentially eligible papers was reviewed independently by the same reviewers before making a final decision on eligibility. Any discrepancies were discussed until a decision was achieved. A third senior reviewer acted as an adjudicator if a decision was not reached (LS).

Study inclusion and exclusion

Studies were included if they met the following criteria: (1) observational cross-sectional, prospective or retrospective cohort studies (2) that investigate any form of PA and/or SB (as defined by the authors) (3) in any population (healthy or with a specific disease condition) (4) before and during the COVID-19 Lockdown (5) in any setting. Published articles that had received ethical approval from an ethics committee and were written in English were included. Studies were excluded if they were not observational in design (eg, qualitative, primary randomised controlled trials, primary case series, editorials or commentaries or study protocols). Furthermore, the rapid publication of studies related to COVID-19 meant many bypassed the typical institutional ethical approval process; therefore, studies were excluded if they failed to explicitly include an explicit statement stating that institutional ethical approval was received. If no ethical approval was in the manuscript, corresponding authors were contacted to establish if institutional approval had been granted. If no reply was received, or institutional ethics was confirmed as being not obtained, these studies were excluded (see online supplemental table 2).

Primary outcomes

The coprimary outcomes were changes in PA and/or SB captured via device-based measures or self-report tools.

Data extraction

Data were extracted by two reviewers (SS and MT) independently including: first author, year, country, aims of the study, type of the study (pretest and post-test, cross-sectional, cohort), descriptions of the lockdown by the authors for the respective location of data collection, number of participants, participant characteristics (eg, age, sex), inclusion criteria, type of recruitment, type and definition of PA and SB investigated, type of measurement of PA and SB, confounding variables, acknowledged limitations by authors and authors conclusions, other/notes. A third reviewer (LS) was available to resolve any discrepancies. The data was synthesised in a narrative approach.

Quality assessment

Risk of bias was assessed by two independent reviewers (SS and MT) using the Newcastle-Ottawa Scale (NOS),[19] later adapted for cross-sectional studies.[20] A third reviewer (LS) was available to resolve any inconsistences. There are three parts in which studies are assessed and stars awarded: (1) selection (max. 5 stars)—representativeness of the sample, sample size, non-respondents and ascertainment of the exposure (risk factor); (2) comparability (max. 2 stars)—participants in different outcome groups are comparable; (3) outcome (max. 3 stars)—assessment of outcome, and statistical test. Scores can range from 0 to 10 stars, with higher scores indicating better quality research.

RESULTS

After initial screening, 187 studies were eligible for full-text review. From these, 66 studies[12 21–84] were eligible for inclusion. The PRISMA flow chart is shown in online supplemental figure 1. Full study characteristics can be found in online supplemental table 3. The 66 included studies yielded a total of 86 981 participants and the age ranged from 13 to 86 years old. Regarding specific populations, forty-five studies were conducted on healthy adults (four in specifically elite athletes and five in university students), and six studies in healthy children. Regarding populations with medical conditions, two studies were conducted on adult women with eating disorders, two respective studies with adult participants with type 1 and types 2 diabetes, one respective study with adult participants with 'chronic medical conditions', one study on heart failure patients, one study on neuromuscular disease, one study on obesity clinic patients, one study on participants with a 'perceived risk' of severe COVID-19 symptoms, one study on pregnant women and one study reported on children with obesity. The mean NOS score of the included studies was 4.8 (SD=1.0; range 3–7;). For detailed NOS scoring, see online supplemental table 4.

PA in healthy adults

Forty-five studies examined PA changes in healthy adults, with only four studies[31 75 80 85] using device-based measures of PA. The remaining 41 studies used subjective questionnaires, and in 30 studies these questionnaires were not previously validated. The majority of studies (26/45) reported PA changes in the form of time (eg, METS/min/week, mins/day or steps/day), with the remaining studies reporting PA changes as a percentage of the respective population (see online supplemental table 5).

Of the studies that measured PA change in the form of time spent on PA, all but one study[70] reported overall decreases in the amount of PA pre-COVID-19 versus post-COVID-19 lockdown. When stratifying across different forms of PA, two studies[27 28] reported increases in time spent in 'leisure-time PA' and one study[85] reported increases in time spent in 'endurance training' in elite cyclists, although total PA still decreased in all three studies. All other studies reported time spent in all subtypes of PA—for example, light, moderate, vigorous and walking—(if specified) decreased. Of the studies that measured PA changes as a percentage of the respective populations, eight studies[29 33 38 53 55 59 67 81] reported that >50% of the examined population decreased PA during lockdown, with all other studies reporting >50% of the examined population's PA either stayed the same or decreased. For further information, see online supplemental table 5.

PA in healthy children and adolescents

Of the six studies that examined PA changes in healthy children and adolescents, all were measured using subjective questionnaires, with half using validated questionnaires. Two studies[48 84] used total scores from validated questionnaires and two studies[65 82] reported PA changes in the form of a time measurement, all reporting decreases in PA. Two studies[62 71] reported PA changes as a percentage of the respective population and reported >50% of the population decreased their PA during lockdown.

PA in adults and children with medical conditions

Thirteen studies examined populations with medical conditions for which all but one study,[80] used subjective measurements of PA change, and in only 6/12 were these previously validated measurement tools. Regarding the types of changes reported, nine studies[23 26 36 40 43 44 72 80 86] reported changes in time spent in PA, all reporting decreases in PA time. The remaining four studies[34 66 69 74] reported PA changes as a percentage of respective populations, with all reporting >50% of the population decreasing their PA during lockdown.

SB in healthy adults

Of the 26 studies examined changes in SBs, 18 were conducted in healthy adults. All studies used subjective questionnaires and validated questionnaires were used in six. Studies reported changes in SB as either time spent on SB or as a percentage of the sample. The majority of studies (13/18) reported SB changes in the form of time spent, with the remaining studies reporting SB changes as a percentage of the respective population. Increased SB was reported in all 26 studies. For further information, see online supplemental table 6.

SB in healthy children and adolescents

Of the five studies that measured changes in SB in children and adolescents, three studies[42 62 65] used non-validated questionaries and the remaining two studies[71 82] used validated questionaries. Time spent in SB was reported in 3/5 studies, with the remaining two studies reporting changes in SB as a percentage of their respective populations. All five studies reported increases in SB.

SB in adults and children with medical conditions

All of the three[26 43 86] studies that measured changes in SB in special populations used non-validated questionnaires, and reported that time spent in SB increased during the lockdown.

DISCUSSION

The current systematic review of 66 studies demonstrated that the majority of studies found that PA declined and SB increased during the COVID-19 pandemic lockdown, regardless of the subpopulation or the methodology used. In healthy adults and children, PA during lockdown decreased compared with prelockdown, despite various government organisations and health or exercise practitioners providing guidance on how to stay active during the pandemic and in self-quarantine.[87–89] When stratifying between prelockdown PA levels, three studies found that people who were more active prelockdown were more likely to show larger decreases in PA.[37 49 67]

PA has also been consistently linked with several mental health conditions, suggesting that decreases in PA may lead to increases in undesirable mental health outcomes. Indeed, studies have shown significant increases in anxiety and depression levels during the lockdown.[10] Given that decreases in PA have been shown to yield negative affect, increases in anxiety and lower energy levels,[39] PA promotion during lockdowns should be aimed not just as people who are currently sedentary, but also for those with high PA levels outside of lockdown. Due to the likelihood of further COVID-19-related restrictions (or another similar pandemic), the promotion of digital based PA (such as PA apps, online video fitness classes or physical training) is recommended. Digital based PA yielded favourable results during the first COVID-19 lockdown, with studies showing positive associations with such digital based initiatives and overall PA during a lockdown.[83]

Another finding of this review was that participants who had medical conditions also yielded decreases in PA levels, except for patients with an eating disorder. The decreases in PA is particularly concerning as in several of the medical conditions studied because PA can be a form of treatment or symptom alleviation. For example, levels of PA have been shown to be positively associated with quality of life outcomes in both type 1 and type 2 diabetes.[90 91] Concurrently, increases in SB have been shown to yield detrimental outcomes in patients with these conditions, except for patients with eating disorder.[92 93] Given these added risks of decreasing PA and increasing SB in these special populations, PA promotion and strategies to reduce SB should be implemented should further lockdowns occur. Moreover, practitioners working with these groups should be especially mindful of the detriment that decreasing PA and increasing SB could yield during lockdowns and make the monitoring of PA levels a priority. Patients with eating disorders were found to increase their PA, specifically exercise, during lockdowns. This is equally concerning as there is often pathological relationship between eating disorders and exercise and can lead to increased risks of physical complications such as stress fractures.[94] Therefore, practitioners working with patients with eating disorders are advised to keep closely monitoring patients as much as possible during future lockdowns.

There were also large decreases in both the training volume and training intensity of elite athletes while in lockdown, which has led to relative decreases in sport-specific physical performance tests post-lockdown.[85] This decrease in athletic readiness for competition should be noted and considered by practitioners who are working with elite athletes, especially regarding training loads and competition scheduling postlockdown.

According to the behavioural change wheel, for a behaviour—for example, PA or SB—to occur, there are three components that are required: capability (psychological and physical), opportunity (physical and social) and motivation (reflective and automatic).[95] Despite information on safe exercise during lockdown being available from exercise professionals and some governments (psychological capability), it is not clear from the included studies the reasons why people did or did not engage in PA; however, we can speculate potential reasons for these findings. A reduction in PA is expected as lockdowns required that governments closed sport and leisure facilities, group activities were suspended, and in many countries limits were in place for time spent outdoors.[96] This potentially meant people's regular PA routines were difficult to continue with during lockdown, as indicated by the evidence stating that people considerably changed their modes of PA during lockdown.[97] For example, one study found that all types of PA decreased except for 'moderate intensity leisure-time PA' (such as housework and gardening) increased,[26] another found that 'yard work' increased,[77] and another found that 'housework' increased during lockdown.[82] However, despite these mode-specific increases, total PA levels in these respective populations still decreased. This suggests that promoting increases in house-related PA may not be sufficient to increase total PA during lockdowns.

There was also an increase in the number of people working from home during lockdown,[98] consequently, PA ordinarily accumulated during commuting will have substantially decreased. A previous study found that adults in the UK (mean age 50.5 years) accumulated 195 min/week (±188.6) of active travel.[99] Those who actively commute report significantly greater total PA than those who do not, despite no significant differences in recreational PA shown.[99 100] In addition, with schools closed, many parents were balancing home schooling, while working from home themselves; in the UK, this was the case for 85% of employees with school-aged children.[101] A decrease in opportunities to be active and additional responsibilities may have led to a decrease in PA.

The majority of the studies in this review showed increases in SB during lockdown. This is unsurprising as many people worked from home, leading to extended sedentary periods and increased screen time.[102 103] For instance, de Haas *et al*[104] reported that 44% of Dutch workers had either started to work from home or increased their home working hours, with 30% reporting increases in remote meetings (eg, via videoconferencing). In addition, with most gyms, leisure and sporting facilities closed, time allowed outdoors limited or not allowed, some people may have found it difficult to be active during the lockdown.[3 105] With increased 'free' time, many may resort to engaging in pastimes such as reading, playing video games and watching television (TV), many of which are sedentary.[67]

Given that the majority of studies reported a decrease in PA with a concurrent increase in SB during the lockdown, and the impact of these on physical and mental health, it is recommended that interventions or policies are implemented to increase PA (eg, body weight home-workouts, using online exercise classes, walking, running and cycling outdoors) and decrease SB (eg, by using a standing desk and taking regular breaks from sitting)

should further lockdowns be enforced in the future. In addition, interventions for PA and/or SB postlockdown should consider that individuals may suffer deconditioning as a result of the lockdowns.

Many of the included studies used surveys to gather information about 'exercise', 'PA, 'sport' and 'training' but failed to report on how these terms were defined to participants. Future studies should report these definitions for clarity and comparison to be made more easily between studies. This lack of definition may mean that despite 'exercise' and 'training' decreasing, changes in daily PA may be different in these studies. Monbiot[106] reports volunteers providing food packages, collecting medical supplies for the elderly, providing childcare for those in need, meaning they potentially accumulate similar or more 'activity' than they realise as it is not prescribed 'exercise' or 'training'.

It is important to note different degrees of lockdown in different countries, even regions within a country, across different dates occurred, making it difficult to quantify the severity of a lockdown and therefore challenging to objectively assess how this impacted behaviours. For instance, those in countries that were able to exercise outdoors following social distancing guidelines may have engaged differently in PA/SB behaviours to those who were not able to leave home, despite both countries being in 'lockdown'. Although the authors have presented the lockdown descriptions for each included study as reported by the authors, these description vary greatly in detail, making it challenging to categorise them into 'levels' of lockdown. The creation of a scale to indicate lockdown severity would be highly beneficial for comparisons to be made between countries when investigating different behaviours, or at the very least it is recommended that this type of information is reported in all future studies. Moreover, within countries some people are given specific guidance (eg, shielding) which requires more intensive lockdown than the general population—none of the included studies recorded this information. It may be beneficial to know participants adherence to lockdown guidelines to provide an indication of potential opportunity to engage in PA. Most studies also report PA without investigating in detail the types, intensities and durations of PA engaged in before and during lockdown, thus, it would be beneficial to investigate these as the magnitude of changes will impact the effects on health.

Limitations

While this systematic review is the first to our knowledge to assess changes in the frequency and modes of PA and SB preockdown versus during the COVID-19 lockdown, the findings should be considered within the limitations of the study. First, the tools used to measure PA and SB were highly heterogeneous, making direct comparison of respective results difficult. Second, demographic information was largely limited, meaning that we were unable to assess any further changes according to demographics further than the discussed topics, which would have given more insight into the review. In addition, the vast majority of studies were based on subjective questionnaires, which carry with them inherent limitations.[107] Moreover, many studies asked participants retrospectively about their prelockdown behaviours and their current behaviours during lockdown, thus, the accuracy of participants abilities to accurately recall their behaviours may be questionable. Lastly, most of the studies included were not designed to be nationally representative, making the generalisation of these results difficult.

Future research in this area should focus on yielding directly comparable data using validated PA and SB questionnaires or using objective accelerometer data where possible. In addition, it would be beneficial to have more detailed demographic information, information on the severity of lockdown and participant adherence to lockdown guidelines, and more detailed information on PA behaviours, for instance, the types, intensities and duration of PA before and during lockdown. Future research should also consider investigating the magnitude of the decrease in PA and increases in SB across different populations during the lockdown to aid the identification of populations most in need of targeted interventions. Lastly, future research should consider investigating the reasons why people are showing changes in PA and/or SB. Using behavioural change theory to assess barriers and facilitators to PA/SB during lockdowns would be highly beneficial in the creation of future interventions and policies should lockdowns occur in the future.

CONCLUSION

During the COVID-19 lockdown, PA levels have significantly reduced with concurrent increases in SB. Considering the evidence of favourable outcomes of higher levels of PA and lower levels of SB in both physical and mental health outcomes, and the emerging evidence that exercise can yield favourable COVID-19 outcomes, it is recommended that public health officials promote ways of increasing PA and reducing SB should further lockdowns occur, especially in populations with medical conditions that are improved by PA, such as type 1 and type 2 diabetes. Interventions designed for postlockdown should also consider that individuals may suffer from deconditioning during the lockdown period, especially in athletic populations and people with medical conditions.

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Supplementary Table 1: Database search strategy

Database	**Search terms**
Pubmed	((COVID-19[Title/Abstract] OR "Novel Coronavirus"[Title/Abstract] OR "2019 novel coronavirus"[Title/Abstract] OR 2019-nCoV[Title/Abstract] OR SARS-CoV-2[Title/Abstract]) AND (isolation[Title/Abstract] OR lock*[Title/Abstract] OR self-isolation[Title/Abstract])) AND ("Physical activity"[Title/Abstract] OR exercise[Title/Abstract] OR walking[Title/Abstract] OR running[Title/Abstract] OR cycling[Title/Abstract] OR swimming[Title/Abstract] OR sports[Title/Abstract] OR sedentary[Title/Abstract] OR "sedentary behaviour"[Title/Abstract] OR activity[Title/Abstract] OR "screen time"[Title/Abstract] OR sitting[Title/Abstract])
CINAHL, PSYCinfo and SPORTdiscus (searched via EBSCOHOST)	Title and abstract: ((COVID-19 OR "Novel Coronavirus" OR "2019 novel coronavirus" OR 2019-nCoV OR SARS-CoV-2) AND (isolation OR lock* OR self-isolation) AND ("Physical activity" OR exercise OR walking OR running OR cycling OR swimming OR sports OR sedentary OR "sedentary behaviour" OR activity OR "screen time" OR sitting))
Embase (searched via OVID)	Title and abstract: ((COVID-19 OR Novel Coronavirus OR 2019 novel coronavirus OR 2019-nCoV OR SARS-CoV-2) AND (isolation OR lock* OR self-isolation) AND (Physical activity OR exercise OR walking OR running OR cycling OR swimming OR sports OR sedentary OR sedentary behaviour OR activity OR screen time OR sitting))
Social Sciences Citation Index	Topic (title, abstract, keyword, and keyword plus) ((COVID-19 OR "Novel Coronavirus" OR "2019 novel coronavirus" OR 2019-nCoV OR SARS-CoV-2) AND (isolation OR lock* OR self-isolation) AND ("Physical activity" OR exercise OR walking OR running OR cycling OR swimming OR sports OR sedentary OR "sedentary behaviour" OR activity OR "screen time" OR sitting))
Cochrane	Title, abstract and keyword ((COVID-19 OR "Novel Coronavirus" OR "2019 novel coronavirus" OR 2019-nCoV OR SARS-CoV-2) AND (isolation OR lock* OR self-isolation) AND ("Physical activity" OR exercise OR walking OR running OR cycling OR swimming OR sports OR sedentary OR "sedentary behaviour" OR activity OR "screen time" OR sitting))
Scopus	Title, abstract and keyword ((COVID-19 OR "Novel Coronavirus" OR "2019 novel coronavirus" OR 2019-nCoV OR SARS-CoV-2) AND (isolation OR lock* OR self-isolation) AND ("Physical activity" OR exercise OR walking OR running OR cycling OR swimming OR sports OR sedentary OR "sedentary behaviour" OR activity OR "screen time" OR sitting))
Opengrey	((COVID-19 OR "Novel Coronavirus" OR "2019 novel coronavirus" OR 2019-nCoV OR SARS-CoV-2) AND (isolation OR lock* OR self-isolation) AND ("Physical activity" OR exercise OR walking OR running OR cycling OR swimming OR sports OR sedentary OR "sedentary behaviour" OR activity OR "screen time" OR sitting))

Supplementary Table 2: Details of excluded studies based on ethical approval

Author	Title	Study Location
Barchetta, et al. (2020)	Effects of work status changes and perceived stress on glycaemic control in individuals with type 1 diabetes during COVID-19 lockdown in Italy.	Italy
Barone et al. (2020)	The impact of COVID-19 on people with diabetes in Brazil	Brazil
Barrea et al (2020)	Does Sars-Cov-2 threaten our dreams? Effect of quarantine on sleep quality and body mass index	Italy
Brand, Timme, and Nosrat, Sanaz (2020)	When Pandemic Hits: Exercise Frequency and Subjective Well-Being During COVID-19 Pandemic	Global - Austria, Brazil, China, Finland, Germany, Greexe, Iceland, Iran, Italy, Malaysia, Phillipines, Russia, Spain, Switzerland, Taiwan, Turkey, UK, USA
Cacioppo et al (2020)	Emerging health challenges for children with physical disabilities and their parents during the COVID-19 pandemic: The ECHO French survey	France
Capaldo et al (2020)	Blood Glucose Control During Lockdown for COVID-19: CGM Metrics in Italian Adults With Type 1 Diabetes.	Italy
Chouchou et al (2020)	The importance of sleep and physical activity on well-being during COVID-19 lockdown: reunion island as a case study.	Reunion Island
Cransac-Miet et al (2020)	Impact of COVID-19 lockdown on lifestyle adherence in stay-at-home patients with chronic coronary syndromes: Towards a time bomb.	France
de Haas, Faber, and Hamersma (2020)	How COVID-19 and the Dutch ,'intelligent lockdown' change activities, work and travel behaviour: Evidence from longitudinal data in the Netherlands	The Netherlands
Di Renzo et al (2020)	Eating habits and lifestyle changes during COVID-19 lockdown: an Italian survey	Italy
Jelaca et al (2020)	A REPORT ON THE IMPACTS OF THE CORONAVIRUS SARS-COV-2 SHELTER-IN-PLACE ORDER" ON FITNESS AND WELL-BEING.	USA
Gornicka et al (2020)	Dietary and Lifestyle Changes During COVID-19 and the Subsequent Lockdowns among Polish Adults: A Cross-Sectional Online Survey PLifeCOVID-19 Study.	Poland
Khader and Jabeen (2020)	A cross sectional study reveals severe disruption in glycemic control in people with diabetes during and after lockdown in India	India
Mutz and Gerke (2020)	Sport and exercise in times of self-quarantine: How Germans changed their behaviour at the beginning of the Covid-19 pandemic	Germany
Pepin et al (2020)	Wearable Activity Trackers for Monitoring Adherence to Home Confinement During the COVID-19 Pandemic Worldwide: Data Aggregation and Analysis.	Global - Australia, Canada, China, France, Germany, Ireland, Italy, Japan, Netherlands, Singapore, Spain, Sweden, Switzerland, UK, USA
Radtke et al (2020)	Recommended shielding against COVID-19 impacts physical activity levels in adults with cystic fibrosis	Switzerland

Rastogi and Hiteshi (2020)	Improved glycemic control amongst people with long-standing diabetes during COVID-19 lockdown: a prospective, observational, nested cohort study	India
Sassone et al (2020)	Impact of COVID-19 Pandemic on Physical Activity in Patients With Implantable Cardioverter-Defibrillators	NR
Verma et al (2020)	Impact of lockdown in COVID 19 on glycemic control in patients with type 1 Diabetes Mellitus	NR
Zhang et al (2020)	Emotional eating in pregnant women during the covid-19 pandemic and its association with dietary intake and gestational weight gain	China

Supplementary Table 3: Characteristics of included studies

Author	Study design	Country	Population	Total participants	Age Range	Age Mean (SD)	Sex % Female	Physical activity measurement tool	Sedentary behaviour measurement tool	Total NOS score	Description of lockdown*
Ammar et al (2020)	Cross-sectional	Global	Adults - general	1047	18+	NR	53.8	IPAQ	IPAQ	6	Unspecified 'confinement conditions'
Asiamah et al (2020)	Cross-sectional	Ghana	Adults - General	621	18-64	NR	35	Questionnaire - not validated	Questionnaire - not validated	5	'The enforcement of social distancing protocols in affected regions'
Assaloni et al (2020)	Observational	NR	Adults - Type 1 diabetes	154	NR	44.8 (12.5)	45.50	Godin-Leisure Time Exercise questionnaire	None	5	'National Quarantine'
Barwais (2020)	Cross-sectional	Saudi Arabia	Adults - General	244	18-50	33.8 (7.7)	36.90	IPAQ-SF	None	5	'Imposed a 24-hour curfew on the cities of Mecca and Medina, with limited exceptions for safety and life. All schools and universities were also closed, international and domestic flights were suspended, and attendance at workplaces in all government and private sector businesses was prohibited. In addition, all malls, markets, restaurants, and gatherings on beaches were forbidden [5]. The KSA also suspended sporting activities, events, and competitions, including those at private sports halls and centres'
Bivi-Roig et al (2020)	Cross-sectional	Spain	Adults - Pregnant women	90	NR	33.1 (4.6)	100	Questionnaire - not validated	Questionnaire - not validated	5	'Strict confinement'
Bourdas et al (2020a)	Cross-sectional	Greece	Adults - General	8495	NR	37.2 (0.2)	61.7	Active-Q	None	4	'Movement outside of the house was permitted only for specific reasons, that including moving to or from the workplace, shopping for food or medicine, visiting a doctor or assisting a person in need for

											help, and exercising outside individually or in pairs.'
Bourdas et al (2020b)	longitudinal observational	Greece	Adults - General	1015	NR	40.33 (0.41)	57.44	Active-Q	NR	6	NR
Bowes et al (2020)	Cross-sectional	Global - (UK94%)	Adults - Elite Sport	95	18-34	NR	100	Questionnaire - not validated	None	5	NR
Branley-Bell et al (2020)	Cross-sectional	UK	Over 16 years of age with experience of an eating disorder	129	16-65	29.27 (38.99)	93.8	Questionnaire - not validated	NR	3	NR
Buoite Stella et al (2020)	Cross-sectional	Italy	Adults - General	400	NR	35 (15)	69	IPAQ-SF and Smartphone accelerometer or consumer activity tracker	None	4	'The Italian government enacted a national lockdown restricting the movement of the population except for necessity, work, and health circumstances. Most of the population stayed at home for most of the time. In particular, outdoor physical activity (PA) was prohibited, while gym and sport clubs were closed as per governmental measures'
Callow et al (2020)	Cross-sectional	USA and Canada	Adults - General	1046	50+	NR	80	Questionnaire - not validated	None	5	NR
Cancello et al (2020)	Cross-sectional	Italy	Adults - General	492	18+	NR	84	Questionnaire - not validated	None	5	'The containment measures limited people leave the house only for urgent needs only such as shopping for foods and serious health reasons and most working subjects converted the habitual occupation into "at home" smart working.'
Caruso et al (2020)	Observational	Italy	Adults - Type 1 diabetes	48	NR	42.4 (15.9)	47.9	Questionnaire - not validated	None	4	'People were not allowed to leave their houses except for urgent necessity, and all non-essential businesses were forced to close with employees

											being either put on furlough or home working.'
Castaneda-Babarro Coca et al (2020)	Cross-sectional	Spain	Adults - General	3800	18-65	42.7 (10.4)	46	IPAQ-SF	IPAQ-SF	3	'a lockdown to restrict travel and cancel non-essential services in order to stop the spread of coronavirus disease'
Castellini et al (2020)	Longitudinal observational	Italy	Adults - FEMALE with Anorexia Nervosa (AN) and Bulimia Nervosa (BN)	171	NR	31.74 (12.76)	100	EDE-Q	None	5	'the national and regional governments imposed a progressively increasing level of isolation, with the final general lockdown on March ninth'
Constandt et al (2020a)	Cross-sectional	Belgium	Adults - General	11763	18-74	NR	47.4	Ordinal question: exercising more, exercising the same, exercising less	Questionnaire - not validated	6	'Schools were closed, and working from home became the new standard whenever possible. Furthermore, citizens were allowed and even encouraged by the government to exercise, but with considerable restrictions.'
Constant et al (2020b)	Cross-sectional	France	Adults - General	4005	NR	NR	55.4	Questionnaire - not validated	Questionnaire - not validated	7	'Nationwide confinement, the restriction of individuals to their homes, was one of the measures enforced in many countries, including France on March 17, 2020'
Di Corrado et al (2020)	Cross-sectional	Italy	Adults - General	367	17-73	33.35 (12.8)	49	Questionnaire - not validated	None	4	'Governments' immediate protective restrictions included full lockdowns of cities, travel, restricted social congregations, including sports events, concerts, restaurants, and the closing of schools and universities'
Di Stefano et al (2020)	Cross-sectional	Sicily	Adults - Neuromuscular Disease	149	NR	57.3 (13.7)	38	IPAQ-SF	None	3	'It is well-known that in this period, due to the restrictive measures adopted by the government, all sports facilities were closed and the practice of outdoor PA in public parks and gardens was forbidden'

Dogas et al (2020)	Cross-sectional	Croatia	Adults - General	3027	NR	Median (IQR) 40 (30-50)	79.7	Online survey - not validated	None	6	'Long-term home confinement and quarantine'
Dutta et al (2020)	Observational	India	Children - General	153	8-16	NR	NR	None	Questionnaire - not validated	4	'Restrictions on various social practices and behaviour. People had to their spend time mostly confined at their homes. School, college, and offices were initially closed and later were partially or fully resumed in virtual platform with the help of electronic devices and Internet facility.'
Elran-Barak and Mozeikov (2020)	Cross-sectional	Israel	Adults - Chronic Medical Conditions	315	NR	NR	60	None	Questionnaire - not validated	3	'Israelis were not allowed to leave their homes unless absolutely necessary, putting a near-lockdown into effect. Essential services—including grocery stores, pharmacies, and banks—remained open, but people were prohibited from venturing more than 100mfrom their homes, apart from under certain circumstances (e.g., stocking up on food and medicine). Non-essential stores were required to close, and parks were to remain shut. People were required not to participate in any social gatherings and to limit face-to-face interactions with individuals outside the immediate household'
Endstrasser et al (2020)	Prospective cohort	Austria	Adults - with end stage osteo arthritis	63	26-86	62.4 (11.84)	44	Tegner activity scale	NR	4	NR
Ernstsen et al (2020)	Cross-sectional	Norway	Adults - General	1281	18-81	48.9 (11.4)	31	Questionnaire - not validated	None	5	'organized sports activities were to be dis-continued and several businesses were closed, including stadiums, gyms and swimming pools'

Galle et al (2020a)	Cross-sectional	Italy	Adults - students	2125	NR	22.5 (0.08)	62.8	Questionnaire - not validated	NA	4	'limits the movement of individuals in the whole Italian national territory unless strictly motivated (in written form) by reasons of work or health. Shops must stay closed but those selling essentials, such as supermarkets or pharmacies need to ensure a distance of at least 1 m between customers. Schools, museums, cinemas, theatres, and any other social, recreational, or cultural centre must stay closed. Any gathering in public spaces is forbidden, including sporting events and funerals. At the same time, in order to minimize the possible side effects of the lockdown on health, the Italian Ministry of Health issued a series of recommendations targeted at four rules for maintaining a healthy lifestyle: correct diet, daily physical activity (PA), reduce alcohol consumption and no smoking'
Galle et al (2020b)	Cross-sectional	Italy	Adults - General	1430	NR	22.9 (3.5)	65.5	IPAQ	ASBQ	6	'People were allowed to move only for work or health reasons or to buy essentials. Therefore, the great part of the Italian population was forced to live in home-confinement for weeks'
Gallo et al (2020)	Longitudinal observational	Australia	Adults - undergraduate students	149	NR	NR	0	Active Australia survey	NR	6	'All but essential services were shut down and universities transitioned all undergraduate learning online. By 30 March 2020, people were only allowed to leave their homes for work (in an essential service), or to purchase food, receive or

											provide medical care, or exercise.'
Gilic et al (2020)	Prospective cohort	Bosnia and Herzegovina	Adolescents	688	15-18	17	46.8	PAQ-A	None	4	'measures of social distancing had been imposed, including the closing of schools, sports clubs, fitness centres, and shopping malls, and public gatherings were restricted.'
Giustino et al (2020)	Cross-sectional	Italy	Adults - General	802	NR	32.27 (12.81)	51	IPAQ	NR	4	NR
He et al (2020)	NR	China	Adults - General	339	NR	36.4 (11.9)	0	Questionnaire - not validated	None	5	'Chinese New Year celebrations were cancelled, collective activities, bus and railway service was suspended, and factories and restaurants were closed. Curfew and quarantine measures were implemented in many mainland cities. The flow of people was controlled by allowing only 1 person from each household to go out to buy necessities every 2-3 d.'
Husain and Ashkanani (2020)	Cross-sectional	Kuwait	Adults - General	415	18-73	38.47 (12.73)	68.7	Questionnaire - not validated	Questionnaire - not validated	5	Kuwait imposed a partial nationwide curfew on the 22nd of March 2020 until further notice. The government then imposed a total lockdown from the 10th to the 31st of May 2020.
Ingram et al (2020)	Cross-sectional	Scotland	Adults - General	399	18-72	32.4 (11.4)	56.4	Questionnaire - not validated	None	4	'Scotland was under strict lockdown conditions where leaving the house was allowed for necessary work, to shop for essentials, and for unrestricted exercise.'
Karuc et al (2020)	Cross-sectional	Croatia	Adults - General	59	NR	21.6 (0.4)	100	SHAPES	None	5	'the Croatian Government adopted measures to restrict gathering in public places and parks,

											suspend public transportation, and close institutions. Besides all social gatherings, work in retail and services including sports activities were prohibited'
Knell et al (2020)	Cross-sectional	USA	Adults - General	1809	NR	NR	67.4	IPAQ	None	4	'The specific of these initiatives varied by state, but they generally included advisories to stay home, bans on large gatherings, restricted access to parks and community resources, closure of schools and non-essential businesses, and quarantine orders'
Kriaucioniene et al (2020)	Cross-sectional	Lithuania	Adults - General	2447	NR	NR	87.8	Questionnaire - not validated	None	5	'the Lithuanian Government decided to declare quarantine from 16 to 30 March [2]. This was extended several times and ended on 16 June. All public indoor and outdoor gatherings were prohibited. Educational institutions began to work remotely. Shops excluding grocery shops and pharmacies were closed. Restaurants and bars were also closed, leaving the option for food takeaway'
Lopez-Bueno et al (2020a)	Cross-sectional	Spain	Adults - General	2042	NR	35.9(13.6)	54.1	PAVS short form	None	4	'Government-enacted national confinement - During the confinement period, the Spanish population had to stay at home'
Lopez-Bueno et al (2020b)	Cross-sectional	Spain	Adults - General	1591	NR	34.2 (13)	51.8	Questionnaire - not validated	Questionnaire - not validated	5	'Confinement measures to minimize the propagation of the virus'
Majumdar et al (2020)	Cross-sectional	India	Adults - office workers	203	NR	33.1 (7.11)	18.22	None	Questionnaire - not validated	4	

			Adults - undergraduate students	325	NR	22.1 (1.66)	60.92	None	Questionnaire - not validated		'Home confinement as a measure to mitigate disease outbreak'
Mandelkorn et al (2020)	Cross-sectional	Various (49 countries)	Adults - General	2562	NR	45.18 (14.46)	68.18	Questionnaire - not validated	None	4	NR
Maugeri et al (2020)	Cross-sectional	Italy	Adults - General	2524	NR	NR	56.4	IPAQ-SF	None	5	'movement of the population, schools, public places and businesses were shutdowns. Moreover, people can move away from their home only to do essential work (healthcare and social care sectors, police and armed forces, firefighting, water and electricity supply) or perform essential activities (health visits, purchasing medicines or food).'
			Young adults (<21yrs)	346	<21	NR	NR				
			Young adult (21-40)	1178	21-40	NR	NR				
			Adults aged 41-60	704	41-60	NR	NR				
			Adults aged 60+	296	60+	NR	NR				
Meyer et al (2020)	Cross-sectional	USA	Adults - General	3052	18-75+	NR	62	Questionnaire - not validated	Questionnaire - not validated	5	'Social isolation' and 'stay at home isolation'
Mitra et al (2020)	Retrospective cohort	Canada	Children 5-17	1472	5-17	NR	NR	Questionnaire - not validated	Questionnaire - not validated	4	'maintaining physical distance from others by two or more metres (except those living in the same household), prohibiting social gatherings, cancelling team sports and related events, and closing playgrounds and parks (in some jurisdictions) (Govt. of Canada, 2020; The Canadian Urban Institute, 2020). Most public schools and school grounds were closed across the country in response to the pandemic and classroom lessons were replaced by home-schooling and online learning.'
			Children 5-11	693	5-11	NR	NR				
			Youth 12-17	779	12-17	NR	NR				
Mon-Lopez et al (2020a)	Cross-sectional	Spain	Adults - professional handball players	187	NR	NR	35.3	Questionnaire - not validated	NR	6	'Specifically, in handball, the last matches in Spain were played on 7–8 March 2020, and all handball players had to remain in their respective

											houses at least until 4 May 2020 (almost eight weeks).'
Mon-Lopez et al (2020b)	Cross-sectional	Spain	Adults - General	120	NR	36.65 (13.61)	50	IPAQ	Questionnaire - not validated	5	'Home confinement as a measure to mitigate disease outbreak'
Munasinghe et al (2020)	Longitudinal observational	Australia	Adolescents	464	13-19	NR	NR	Questionnaire - not validated	Questionnaire - not validated	5	'One of the key strategies to reduce the rate of infection has been physical distancing and, for school- aged children, a move to the online delivery of schooling. Authorities requested that people remain in their homes wherever possible and limit their travel to obtaining essential goods and services.'
Muriel et al (2020)	Longitudinal observational	Spain	Adults - professional cyclists	18	NR	24.9 (2.8)	0	Objective data collection - specialist software	None	6	NR
Pellegrini et al (2020)	Retrospective observational	Italy	Adults - patients from obesity clinic	150	NR	47.9 (16)	77.3	Questionnaire - not validated		4	'People had to stay at home and were only allowed to go out to buy food or for health reasons; all working activities were suspended or turned into smart working at home, except for essential activities (health workers, food supply and sale, cleaning of cities, and police, etc.).'
Pietrobelli et al. (2020)	Cross-sectional	Italy	Children with obesity	41	Jun-18	13 (3.1)	46.3	Subjective answers from telephone interview	Subjective answers from telephone interview	7	'In Italy who by mandate had to remain in their homes during the "lockdown". Lockdown confinement'
Pillay, L et al (2020)	Cross-sectional	South Africa	Adults - elite athletes	692	NR	NR	33	Questionnaire - not validated	Questionnaire - not validated	6	'In South Africa, level 5 lockdown measures were enforced from 26 March to 30 April (5 weeks). Only essential services, travel and shopping were allowed and exercise outside individual property boundaries was not allowed'

Robinson et al (2020)	Cross-sectional	UK	Adults - General	2002	NR	34.74 (12.3)	61.7	Questionnaire - not validated	Questionnaire - not validated	4	'Formal social lockdown measures to restrict the spread of the virus.'
Rogers et al (2020)	Cross-sectional	UK	Adults - perceived 'at risk' of severe COVID outcomes	9190	35-69	NR	78	NR	NR	6	'Everyone must stay in their homes unless (i) shopping for essentials such as food and medicine, (ii) requiring medical assistance, (iii) caring for vulnerable people, (iv) traveling to and from work if absolutely necessary and (v) to carry out one form of exercise (e.g. walking, running, cycling) each day, either alone or with people who live together. Some adults aged 70 and over and those with specific underlying health conditions including asthma, heart disease, diabetes, and being seriously overweight were also advised to follow stricter social isolation recommendations.'
Romero-Blanco et al (2020)	Cross-sectional	Spain	Adults - undergraduate students	213	NR	20.5 (4.56)	80.8	IPAQ-SF	IPAQ-SF	5	'Being confined to their homes'
Ruiz-Roso et al (2020a)	Cross-sectional	Spain	Adults - T2D	102	45-77	63	51.4	IPAQ	IPAQ	6	NR
Ruiz-Roso et al (2020b)	Cross-sectional	Brazil, Chile, Columbia, Spain, Italy	Adolescents - General	726	16-19	NR	59.6	IPAQ	NR	5	NR
Sanchez-Sanchez et al (2020)	Cross-sectional	Spain	Adults - General	1065	NR	38.7 (12.4)	72.8	Questionnaire - not validated	NR	4	'Restrictive measures and house confinement'
Sankar et al (2020)	Cross-sectional	India	Adults - T2D	110	NR	58.67 (10.8)	61.8	Questionnaire - not validated	NR	3	'confined to remain indoors'
Sanudo et al (2020)	Cross-sectional	Spain	Adults - General	20	20-36	22.6 (3.4)	47	IPAQ and pedometer	IPAQ	6	'Social-distancing and home quarantine'
Savage et al (2020)	Longitudinal prospective	UK	Adults - students	214	NR	NR	72	Exercise Vital Sign (EVS) questionnaire	Questionnaire - not validated	6	'People were required to stay at home, except for essential activities

											(i.e. to shop for necessities and exercise outside once per day).'
Schlichtiger et al (2020a)	Cross-sectional	Germany	Adults - students	1943	NR	23.3 (4.0)	70.7	Questionnaire - not validated	NR	4	'People were obliged to only leave their accommodations for essential occupational requirements or to ensure household supplies.'
Schlichtiger et al (2020b)	Cross-sectional	Germany	Adults - General	110	NR	66 (10)	71	PAQ 50+	NR	5	NR
Srivastav et al (2020)	Cross-sectional	India	Adults - General	143	NR	23.9	NR	IPAQ - SF	IPAQ - SF	6	NR
Vetrovsky et al (2020)	Longitudinal observational	NR	Adults - heart failure patients	26	NR	58.8 (9.8)	44.44	Accelerometery (Garmin wristwatch)	NR	4	'Prohibited movement in public spaces except under special circumstances, which included travelling to and from work and necessary journeys to procure food and supplies; notably, going outside for a walk in a park or the countryside was allowed.'
Wang et al (2020)	Cross-sectional	China	Adults - General	2289	NR	27.5 (12)	48.6	Questionnaire - not validated	Questionnaire - not validated	5	'community-wide lockdowns, home quarantines, working-from-home, social distancing, and the prohibition of social gatherings'
Yang et al (2020a)	Retrospective	China	Adolescents - high school students	2824	NR	17.5 (1.2)	76	IPAQ	IPAQ	5	NR
			Adults - undergraduate students	7024	NR	20.6 (1.8)	70				
			Adults - Graduate students	234	NR	24.6 (3.5)	70.9				
			Adults - general	10082	NR	19.8 (2.3)	NR				
Yang et al (2020b)	Longitudinal observational	USA	Adults - General	431	NR	39.1 (10.6)	49	IPAQ	IPAQ	5	'Stay-at-home policies; closure of gyms; reduced access to outdoor sport facilities; and home office regulation'
Zenic et al (2020)	Longitudinal prospective	Croatia	Adolescents	823	NR	NR	NR	Physical Activity	NR	5	NR

								Questionnaire for Adolescents			

NR = Not Reported; IPAQ, International Physical Activity Questionnaire; IPAQ-SF = International Physical Activity Questionnaire Short-Form; EDE-Q = Eating Disorder Examination Questionnaire; PAQ-A = Physical Activity Questionnaire - Adolescents; SHAPES = School Health Action, Planning, and Evaluation Systems questionnaire; PAVS = Physical Activity Vital Sign; PAQ 50+ = Physical Activity Questionnaire for 50+ *Description of lockdown as reported by respective study authors

Supplementary Table 4: NOS Scores for all included studies (range: 0-10 stars, with higher scores indicating better quality research)

Author	Representativeness of sample	Sample Size	Non-respondents	Ascertainment of the exposure	Comparability	Assessment of the outcome		Statistics	Total 'stars'
Ammar *et al* (2020)	1	1	0	2	0	1		1	**6**
Asiamah *et al* (2020)	1	1	0	1	0	1		1	**5**
Assaloni et al (2020)	1	0	0	2	0	1		1	**5**
Barwais (2020)	1	0	0	2	0	1		1	**5**
Bivi-Roig *et al* (2020)	1	0	0	1	0	1		1	**4**
Bourdas *et al* (2020a)	1	0	0	2	1	1		1	**6**
Bourdas *et al* (2020b)	1	0	0	2	0	1		1	**5**
Bowes *et al* (2020)	1	0	0	0	0	1		1	**3**
Branley-Bell *et al* (2020)	1	0	0	1	0	1		1	**4**
Buoite Stella *et al* (2020)	1	0	0	2	0	1		1	**5**
Callow *et al* (2020)	1	0	0	2	0	1		1	**5**
Cancello *et al* (2020)	1	0	0	1	0	1		1	**4**
Caruso *et al* (2020)	1	0	0	0	0	1		1	**3**
Castaneda-Babarro Coca *et al* (2020)	1	0	0	2	0	1		1	**5**
Castellini *et al* (2020)	1	0	0	2	1	1		1	**6**
Constandt *et al* (2020a)	1	1	0	1	2	1		1	**7**
Constant *et al* (2020b)	1	0	0	1	0	1		1	**4**
Di Corrado *et al* (2020)	1	0	0	0	0	1		1	**3**
Di Stefano *et al* (2020)	1	0	0	2	1	1		1	**6**
Dogas *et al* (2020)	1	0	0	1	0	1		1	**4**
Dutta *et al* (2020)	1	0	0	0	0	1		1	**3**
Elran-Barak and Mozeikov (2020)	1	0	0	1	0	1		1	**4**
Endstrasser *et al* (2020)	1	1	0	1	0	1		1	**5**
Ernstsen *et al* (2020)	1	0	0	1	0	1		1	**4**
Galle *et al* (2020a)	1	1	0	2	0	1		1	**6**
Galle *et al* (2020b)	1	1	0	2	0	1		1	**6**
Gallo *et al* (2020)	1	0	0	1	0	1		1	**4**
Gilic *et al* (2020)	0	0	0	2	0	1		1	**4**

Giustino *et al* (2020)	1	1	0	1	0	1		1	**5**
He *et al* (2020)	1	0	0	1	0	2		1	**5**
Husain and Ashkanani (2020)	1	1	0	0	0	1		1	**4**
Ingram *et al* (2020)	1	1	0	1	0	1		1	**5**
Karuc *et al* (2020)	0	0	0	2	0	1		1	**4**
Knell *et al* (2020)	1	0	0	2	0	1		1	**5**
Kriaucioniene *et al* (2020)	1	0	0	1	0	1		1	**4**
Lopez-Bueno *et al* (2020a)	1	0	0	1	1	1		1	**5**
Lopez-Bueno *et al* (2020b)	1	0	0	1	0	1		1	**4**
Majumdar *et al* (2020)	1	0	0	1	0	1		1	**4**
Mandelkorn *et al* (2020)	1	0	1	1	0	1		1	**5**
Maugeri *et al* (2020)	1	0	0	2	0	1		1	**5**
Meyer *et al* (2020)	1	0	1	0	0	1		1	**4**
Mitra *et al* (2020)	1	1	1	1	0	1		1	**6**
Mon-Lopez *et al* (2020a)	1	0	0	1	1	1		1	**5**
Mon-Lopez *et al* (2020b)	1	0	0	2	0	1		1	**5**
Munasinghe *et al* (2020)	1	0	1	2	1	1		1	**7**
Muriel *et al* (2020)	1	0	0	2	1	1		1	**6**
Pellegrini *et al* (2020)	1	0	0	1	0	1		1	**4**
Pietrobelli *et al* (2020)	1	0	0	1	0	1		1	**4**
Pillay, L *et al* (2020)	1	1	0	2	0	2		1	**7**
Robinson *et al* (2020)	1	1	0	2	0	1		1	**6**
Rogers *et al* (2020)	1	0	0	0	1	1		1	**4**
Romero-Blanco *et al* (2020)	1	1	0	2	0	1		1	**6**
Ruiz-Roso *et al* (2020a)	1	0	0	2	0	1		1	**5**
Ruiz-Roso *et al* (2020b)	1	0	1	2	0	1		1	**6**
Sanchez-Sanchez *et al* (2020)	1	1	0	0	0	1		1	**4**
Sankar *et al* (2020)	1	0	0	0	0	1		1	**3**
Sanudo *et al* (2020)	1	0	0	2	0	2		1	**6**
Savage *et al* (2020)	1	0	1	2	0	1		1	**6**
Schlichtiger *et al* (2020a)	1	0	1	0	0	1		1	**4**

Schlichtiger *et al* (2020b)	1	0	0	2	0	1		1	**5**
Srivastav *et al* (2020)	1	1	0	2	0	1		1	**6**
Vetrovsky *et al* (2020)	1	0	0	0	0	2		1	**4**
Wang *et al* (2020)	1	0	0	2	0	1		1	**5**
Yang *et al* (2020a)	1	0	0	2	0	1		1	**5**
Yang *et al* (2020b)	1	0	0	2	0	1		1	**5**
Zenic *et al* (2020)	1	0	0	2	0	1		1	**5**

Supplementary Table 5. Physical activity pre and during lockdown

Author	PA type and units of measurement	PA Pre-Lockdown Mean (SD)	PA During Lockdown Mean (SD)	Change in PA	P value (if applicable)
Ammar et al (2020)	*All PA*				
	Days/Week	5.0 (2.5)	3.8 (2.8)	- 24.0%	< 0.001
	Min/Week	108.0 (114.2)	71.8 (88.2)	- 33.5%	< 0.001
	MET values	2192.6 (3300.7)	1360.2 (2545.2)	- 38.0%	< 0.001
	Vigorous PA				
	Days/Week	2.0 (2.1)	1.5 (2.0)	- 22.7%	< 0.001
	Min/Week	38.7 (57.1)	26.0 (47.8)	- 33.1%	< 0.001
	MET values	1168 (2468.7)	737.2 (1844.5)	- 36.9%	< 0.001
	Moderate PA				
	Days/Week	1.8 (2.1)	1.36 (2.0)	- 24.0%	< 0.001
	Min/Week	32.1 (49.0)	21.4 (37.3)	- 33.4%	< 0.001
	MET values	446.4 (920.2)	291.5 (772.7)	- 34.7%	< 0.001
	Walking				
	Days/Week	3.6 (2.6)	2.3 (2.5)	- 35.0%	< 0.001
	Min/Week	37.2 (46.8)	24.6 (34.1)	- 34.0%	< 0.001
	MET values	578.3 (917.1)	331.4 (640.2)	- 42.7%	< 0.001
Asiamah et al (2020)	*Moderate PA - % participants*	NR		NR	NR
	No time lost/week		20%		
	1-30 min lost/week		7.2%		
	30-59 min lost/week		11.8%		
	1-3hrs lost/week		28.0%		
	4-6hrs lost/week		12.1%		
	>6hrs lost/week		20.9%		
	Vigorous PA - % participants				
	No time lost/week		29.6%		
	1-30 min lost/week		10.5%		
	30-59 min lost/week		23.2%		
	1-3hrs lost/week		25.4%		
	4-6hrs lost/week		5.6%		
	>6hrs lost/week		5.6%		
Assaloni et al (2020)	*Exercise*				
	Godin Scale score	38.6 (1.7)	25.0 (1.7)	- 13.6	< 0.001
	Minutes per day	66 (42)	38 (31)	- 28	< 0.001

	Steps	12606 (5026)	4760 (3145)	- 7846	< 0.001
	% participants				
	Exercise alone	36.4%	82.5%	+ 46.1%	NR
	No exercise	9.1%	17.5%	+ 8.4%	
Barwais (2020)	*Physical Activity – MET-min/week*				
	All participants	903 (755.6)	387 (397.8)	- 516	< 0.001
	Males	951 (740.5)	398 (413.1)	- 553	< 0.001
	Females	818 (77.5)	368 (369.9)	-450	< 0.01
Bivi-Roig et al (2020)[b]	*Vigorous PA*				
	Days/week	2 (3)	0 (2)	- 2	0.001
	Min/day	60 (70)	0 (30)	- 60	< 0.001
	Moderate PA				
	Days/week	3 (3)	3 (3.5)	0	0.009
	Min/day	60 (80)	60 (60)	0	< 0.001
	Walking				
	Days/week	7 (2)	3 (6)	- 4	< 0.001
	Min/day	90 (60)	30 (60)	- 60	< 0.001
Bourdas et al (2020a)[c]	*PA phase 1 lockdown – MET-min/week*				
	(All participants)				
	Daily occupation PA	4736.30 (124.08)	1945.34 (90.32)	- 2791	< 0.05
	Transportation PA	1309.86 (38.00)	714.21 (30.88)	- 595.65	< 0.05
	Leisure time activities PA	6241.27 (197.67)	7335.26 (196.68)	+ 1093.99	< 0.05
	Sporting activities PA	3511.92 (182.79)	2406.97 (184.54)	- 1105	< 0.05
	Overall PA	15,799.35 (345.60)	12,401.78 (304.26)	- 3397.6	< 0.05
	(Males)				
	Daily occupation PA	5389.69 (207.55)	2310.97 (157.29)	- 3078.7	< 0.05
	Transportation PA	1533.87 (63.91)	885.12 (56.04)	- 648.75	< 0.05
	Leisure time activities PA	5844.67 (291.60)	6962.63 (324.27)	+ 1117.96	< 0.05
	Sporting activities PA	4711.57 (347.93)	2759.22 (223.91)	- 1952.4	< 0.05
	Overall PA	17,479.80 (559.02)	12,917.95 (479.92)	- 4561.9	< 0.05
	(Females)				
	Daily occupation PA	4252.13 (148.71)	1674.41 (104.26)	- 2577.7	< 0.05
	Transportation PA	1143.87 (45.03)	587.56 (33.22)	- 556.31	< 0.05

	Leisure time activities PA	6535.15 (267.42)	7611.38 (243.56)	+ 1076.23	< 0.05
	Sporting activities PA	2622.99 (178.12)	2145.96 (274.78)	- 477.03	> 0.05
	Overall PA	14,554.14 (429.60)	12,019.31 (392.19)	- 2534.8	< 0.05
	PA phase 2 lockdown – MET-min/week				
	(All participants)	4215.07 (78.41)	1968.05 (58.68)	- 2247	< 0.05
	Daily occupation PA	1218.20 (23.71)	697.59 (19.92)	- 520.61	< 0.05
	Transportation PA	6097.88 (127.67)	7422.19 (132.92)	+ 1324.31	< 0.05
	Leisure time activities PA	2763.87 (151.89)	2215.42 (134.19)	- 548.45	< 0.05
	Sporting activities PA	14,295.02 (248.35)	12,303.25 (234.23)	- 1991.8	< 0.05
	Overall PA				
	(Males)				
	Daily occupation PA	5177.27 (182.93)	2711.06 (153.70)	- 2466.2	< 0.05
	Transportation PA	1314.24 (50.73)	841.68 (45.25)	- 472.56	< 0.05
	Leisure time activities PA	6062.08 (289.05)	7198.64 (282.94)	+ 1136.56	< 0.05
	Sporting activities PA	3849.72 (529.94)	2809.8 (509.74)	- 1039.9	< 0.05
	Overall PA	16,403.31 (695.56)	13,561.17 (722.59)	- 2842.1	< 0.05
	(Females)				
	Daily occupation PA	3933.68 (84.90)	1750.77 (60.11)	- 2182.9	< 0.05
	Transportation PA	1190.11 (26.79)	655.45 (21.99)	- 534.66	< 0.05
	Leisure time activities PA	6108.35 (141.75)	7487.56 (150.56)	+ 1379.21	< 0.05
	Sporting activities PA	2446.32 (119.58)	2041.59 (88.39)	- 404.73	< 0.05
	Overall PA	13,678.46 (246.46)	11,935.38 (216.14)	- 1743.1	< 0.05
	PA phase 3 lockdown – MET-min/week				
	(All participants)				
	Daily occupation PA	4284.91 (106.59)	2349.61 (92.47)	- 1935.3	< 0.05
	Transportation PA	1254.93 (34.68)	852.65 (31.60)	- 402.28	< 0.05
	Leisure time activities PA	7007.04 (212.80)	8133.13 (205.16)	+ 1126.09	< 0.05
	Sporting activities PA	2328.27 (144.66)	1901.51 (99.98)	- 426.76	< 0.05
	Overall PA	14,875.14 (328.38)	13,236.89 (284.78)	- 1638.3	< 0.05
	(Males)				
	Daily occupation PA	4806.32 (217.88)	2676.81 (181.48)	- 2129.5	< 0.05
	Transportation PA	1477.38 (77.31)	996.89 (70.51)	- 480.49	< 0.05
	Leisure time activities PA	7075.62 (458.93)	7247.03 (411.29)	+ 171.41	> 0.05
	Sporting activities PA	3404.49 (278.21)	2823.46 (248.08)	- 581.03	< 0.05
	Overall PA	16,763.82 (722.40)	13,744.19 (632.52)	- 3019.6	< 0.05

	(Females)				
	Daily occupation PA	4086.56 (120.91)	2225.13 (107.11)	-1861.4	< 0.05
	Transportation PA	1170.31 (37.37)	797.79 (34.23)	- 372.52	< 0.05
	Leisure time activities PA	6980.94 (236.44)	8470.21 (235.12)	+ 1489.27	< 0.05
	Sporting activities PA	1918.87 (167.14)	1550.79 (97.97)	- 368.08	< 0.05
	Overall PA	14,156.68 (357.50)	13,043.91 (310.87)	- 112.8	< 0.05
	PA phase 4 lockdown – MET-min/week				
	(All participants)				
	Daily occupation PA	4328.27 (123.68)	2174.39 (98.25)	- 2153.9	< 0.05
	Transportation PA	1149.50 (36.35)	812.57 (34.21)	- 336.93	< 0.05
	Leisure time activities PA	6767.79 (206.00)	8622.59 (212.36)	+ 1854.8	< 0.05
	Sporting activities PA	1820.42 (141.94)	1749.32 (171.66)	- 71.1	> 0.05
	Overall PA	14,065.98 (335.14)	13,358.87 (326.99)	- 707.11	< 0.05
	(Males)				
	Daily occupation PA	5477.33 (294.99)	2699.65 (227.52)	- 2777.7	< 0.05
	Transportation PA	1370.91 (84.69)	1008.81 (79.34)	- 362.1	< 0.05
	Leisure time activities PA	7248.37 (511.78)	8009.67 (479.28)	+ 761.3	> 0.05
	Sporting activities PA	2437.01 (350.79)	2561.05 (338.68)	+124.04	> 0.05
	Overall PA	16,533.62 (912.29)	14,279.18 (756.51)	- 2254.4	< 0.05
	(Females)				
	Daily occupation PA	3940.03 (128.76)	1996.91 (105.84)	- 1943.1	< 0.05
	Transportation PA	1074.70 (38.94)	746.27 (36.77)	- 328.43	< 0.05
	Leisure time activities PA	6605.41 (214.51)	8829.68 (233.13)	+ 2224.27	< 0.05
	Sporting activities PA	1612.08 (147.68)	1475.05 (198.13)	- 137.03	> 0.05
	Overall PA	13,232.22 (319.70)	13,047.91 (354.58)	- 184.31	> 0.05
Bourdas et al (2020b)[c]	*Daily occupational PA – MET-min/week*				
	All participants	4502.7 (41.5)	2119.4 (32.1)	- 2383.3	< 0.05
	Males	5232.3 (72.8)	2552.2 (58.8)	- 2680.1	< 0.05
	Females	4049.6 (48.9)	1850.6 (36.7)	- 2199.0	< 0.05
	Transportation PA – MET-min/week				
	All participants	1277.7 (12.7)	751.6 (10.7)	- 526.1	< 0.05
	Males	1442.3 (22.3)	888.3 (19.4)	- 554.0	< 0.05
	Females	1174.4 (15.1)	666.7 (12.5)	- 507.7	< 0.05
	Leisure time PA – MET-min/week				

	All participants	6266.6 (69.3)	7445.7 (70.2)	+ 1179.1	< 0.05
	Males	6186.7 (117.3)	7125.8 (118.0)	+ 939.1	< 0.05
	Females	6316.2 (85.5)	7644.3 (87.0)	+1328.1	< 0.05
	Sporting PA – MET-min/week				
	All participants	3114.3 (75.5)	2369.0 (68.8)	- 745.3	< 0.05
	Males	4227.1 (166.4)	2874.4 (149.2)	- 1352.7	< 0.05
	Females	2423.0 (63.8)	2055.1 (61.7)	- 367.9	< 0.05
	Total PA – MET-min/week				
	All participants	15160.6 (128.6)	12685.7 (120.0)	- 2474.9	< 0.05
	Males	17088.2 (244.6)	13440.6 (237.4)	- 3647.6	< 0.05
	Females	13963.2 (140.2)	12216.7 (126.6)	- 1746.5	< 0.05
	(Age class)				
	18-29 years old	14406 (212.3)	12230.7 (226.3)	- 2175.3	< 0.05
	30-49 years old	15668.9 (209.7)	12894.9 (168.0)	- 2774.0	< 0.05
	50-59 years old	15833.7 (284.0)	13449.1 (248.4)	- 2384.6	< 0.05
	60-69 years old	14402.3 (547.4)	11682.2 (596.0)	- 2720.1	< 0.05
	70 + years old	12364.3 (1535.2)	8472.6 (949.4)	- 3891.7	< 0.05
	(BMI class)				
	Underweight (BMI <18.5)	16626.9 (946.2)	14106.3 (1053.3)	- 2520.6	< 0.05
	Acceptable weight (BMI = 18.5-24.9)	15288.2 (174.0)	12720.7 (165.5)	- 2567.5	< 0.05
	Overweight (BMI = 25.0-29.9)	15022.1 (208.9)	12552.6 (196.4)	- 2469.5	< 0.05
	Obese (BMI ≥ 30.0)	14389.2 (412.7)	12381.8 (284.9)	- 2607.4	< 0.05
	(Baseline PA level)				
	Inactive (0 MET-min/week)	10792.0 (170.7)	10477.3 (175.6)	- 314.7	> 0.05
	Low PA (0-499 MET-min/week)	10204.5 (179.0)	10446.0 (224.8)	+ 241.5	> 0.05
	Moderate PA (500-1000 MET-min/week)	10993.4 (184.2)	10691.1 (203.8)	- 302.3	> 0.05
	High PA (>1000 MET-min/week)	18876.3 (202.9)	14472.9 (193.3)	- 4403.4	< 0.05
Bowes et al (2020)	*Quantity of training - % participants*	NR		NR	NR
	Increased volume		5.7%		
	Decreased volume		75.7%		
	Same volume		17.1%		
	Other		1.4%		
Branley-Bell et al (2020)	*Change in PA - % participants*	NR		NR	NR
	Much less PA		27.9%		
	Moderately less PA		11.6%		
	Slightly less PA		10.1%		

	No change		10.1%		
	Slightly more PA		12.4%		
	Moderately more PA		10.1%		
	Much more PA		14.0%		
Buoite Stella et al (2020)	*Daily step count*				
	All participants	8284 (4390)	3294 (3994)	- 4990	< 0.001
	People working as usual	11045 (5710)	5043 (3289)	- 6002	< 0.001
	People at home	7700 (3832)	2924 (4040)	- 4776	< 0.001
	People involved in structured PA	8520 (4565)	3139 (3237)	- 5381	< 0.001
	People not involved in structured PA	7961 (4147)	3505 (4854)	- 4456	< 0.001
	IPAQ-SF (MET)				
	All participants	3101 (3815)	1839 (2254)	- 1262	< 0.001
	People working as usual	2763 (2906)	1732 (2099)	- 1031	0.001
	People at home	3170 (3975)	1861 (2287)	- 1309	< 0.001
	People involved in structured PA	3478 (3661)	1767 (2041)	- 1711	< 0.001
	People not involved in structured PA	2674 (3949)	1920 (2477)	-754	0.004
Callow et al (2020)	*PA - % participants*	NR		NR	NR
	Much lower		14.2%		
	Somewhat lower		23.4%		
	About the same		35.7%		
	Somewhat greater		15.3%		
	Much greater		9.0%		
Cancello et al (2020)	*PA - % participants*	NR		NR	NR
	Unchanged		15.0%		
	More than usual		22.0%		
	No activity		28.0%		
	Less than usual		35.0%		
	(Active before lockdown)				
	Increased		18.0%		
	Decreased		50.0%		
	Unchanged		14.0%		
	Sedentary		18.0%		
	(Inactive before lockdown)				
	Increased		27.0%		
	Decreased		0%		
	Unchanged		73.0%		

	Sedentary		0%		
Caruso et al (2020)	*PA - % participants* Increased Unchanged Decreased	NR	 18.7% 16.6% 64.6%	NR	NR

Castaneda-Babarro Coca et al (2020)	*Vigorous PA – time (min/day)*				
	All participants	219 (196)	182 (184)	- 37	< 0.001
	Women	175 (176)	159 (174)	- 16	< 0.001
	Men	256 (204)	202 (190)	- 54	< 0.001
	Workers	212.1 (189.9)	177.3 (179.4)	- 34.8	< 0.001
	Students	295.5 (221.0)	223.7 (199.1)	- 71.8	< 0.001
	Study-work	223.6 (196.8)	193.2 (195.2)	- 30.4	< 0.001
	Nothing	213.9 (228.4)	179.6 (201.1)	- 34.3	0.013
	(age categories)				
	18-24 years old	300 (206.6)	246 (189.1)	- 54	< 0.001
	25-34 years old	244 (197.9)	201 (193.6)	- 43	< 0.001
	35-44 years old	209 (189.9)	175 (174.5)	- 34	< 0.001
	45-54 years old	202 (184.4)	171 (183.3)	- 31	< 0.001
	55-65 years old	199 (126)	155 (186.1)	- 44	< 0.001
	(Moderate PA categories)				
	0-150 min/week	187 (176.6)	160 (168.3)	- 27	< 0.001
	150-300 min/week	234 (178.8)	196 (182.3)	- 38	< 0.001
	300-450 min/week	299 (220)	243 (210.8)	- 56	< 0.001
	>450 min/week	409 (267.1)	292 (243.5)	- 117	< 0.001
					< 0.001
	(Vigorous PA categories)				
	0-75 min/week	16 (23.7)	71 (124.7)	+ 55	< 0.001
	75-150 min/week	115 (21.6)	125 (116.2)	+ 10	< 0.05
	150-225 min/week	188 (16.4)	172 (134.2)	- 16	< 0.01
	>225 min/week	400 (170.7)	278 (203)	- 122	< 0.001
	Moderate PA – time (min/day)				
	All participants	149 (174)	145 (170)	- 4	0.102
	Women	133 (160)	144 (159)	+ 11	< 0.05
	Men	163 (185)	145 (179)	- 18	< 0.001
	Workers	143 (169.2)	142.2 (170.6)	- 0.8	0.811
	Students	171.1 (191.8)	143.5 (157.1)	- 27.6	< 0.05
	Study-work	157.4 (177.1)	144 (160.6)	- 13.4	0.141
	Nothing	198 (208.8)	184.6 (190.4)	- 13.4	0.316
	(age categories)				
	18-24 years old	180 (197.3)	149 (154.6)	- 31	< 0.05
	25-34 years old	139 (150.3)	145 (159.4)	+ 6	0.345
	35-44 years old	141 (176.6)	140 (173.5)	- 1	0.830

	45-54 years old	150 (172.7)	142 (170.7)	- 8	0.121
	55-65 years old	169 (191.7)	162 (184.3)	- 7	0.405
	(Moderate PA categories)				
	0-150 min/week	49 (50.5)	91 (199.6)	+ 42	< 0.001
	150-300 min/week	225 (45.2)	197 (156.4)	- 28	< 0.001
	300-450 min/week	286 (39)	278 (204.7)	- 8	0.709
	>450 min/week	643 (146.2)	370 (266.1)	- 273	0.010
	(Vigorous PA categories)				
	0-75 min/week	101 (138.1)	127 (153.9)	+ 26	< 0.001
	75-150 min/week	119 (120.9)	121 (132.8)	+ 2	0.596
	150-225 min/week	136 (146)	128 (156.6)	- 8	0.231
	>225 min/week	196 (208)	171 (193.7)	- 25	< 0.001
	Walking – time (min/day)				
	All participants	282 (253)	116 (189.3)	- 166	< 0.001
	Women	302 (260)	122 (199.3)	- 180	< 0.001
	Men	265 (247)	110 (180.1)	- 155	< 0.001
	Workers	269.3 (246.2)	113.7 (182.7)	- 155.6	< 0.001
	Students	298.8 (246.1)	98.8 (189.7)	- 200	< 0.001
	Study-work	301.3 (249.5)	106.1 (179.6)	- 195.2	< 0.001
	Nothing	403.3 (326.3)	186.6 (267.2)	- 216.6	< 0.001
	(age categories)				
	18-24 years old	321 (281.8)	94 (182.6)	- 227	< 0.001
	25-34 years old	280 (244.2)	97 (161.1)	- 183	< 0.001
	35-44 years old	253 (235.8)	108 (186.8)	- 145	< 0.001
	45-54 years old	285 (256.1)	125 (197.8)	- 160	< 0.001
	55-65 years old	354 (284.1)	160 (213.2)	- 194	< 0.001
	(Moderate PA categories)				
	0-150 min/week	254 (239.6)	102 (180)	- 152	< 0.001
	150-300 min/week	309 (252.3)	121 (181.9)	- 188	< 0.001
	300-450 min/week	340 (272.8)	167 (234.5)	- 173	< 0.001
	>450 min/week	407 (308)	179 (227)	- 228	< 0.001
	(Vigorous PA categories)				
	0-75 min/week	291 (269.1)	127 (211.8)	- 164	< 0.001
	75-150 min/week	248 (219.5)	93 (155.7)	- 155	< 0.001
	150-225 min/week	256 (226.2)	93 (153.8)	- 163	< 0.001

	>225 min/week	299 (264.1)	126 (197.5)	- 173	< 0.001
Castellini et al (2020)	*Compensatory physical exercise score* Females with eating disorders Females without eating disorders	 0.69 (1.84) 0.58 (3.33)	 3.55 (7.72) 0.84 (3.47)	 + 2.86 + 0.26	 < 0.05 > 0.05
Constandt et al (2020a)	*Exercise - % participants* Decreased Unchanged Increased *Walking - % participants* Decreased Unchanged Increased	NR	 45.4% 43.3% 11.3% 60% 32.2% 7.8%	NR	NR
Constant et al (2020b)	*Exercise – % of population (active group)* More As much Less *Exercise – % population (inactive group)* More As much Less No exercise	NR	 36% 23% 46% 58% 5% 7% 40%	NR	NR
Di Corrado et al (2020)	*Active before lockdown - % participants* Active at home during lockdown Not active at home during lockdown *Not active before lockdown - % participants* Active at home during lockdown Not active at home during lockdown	 100% 100% 0% 0%	 85.29% 14.71% 49.36% 50.64%	 - 14.71% - 85.29% + 49.36% + 50.64%	NR
Di Stefano et al (2020)	*Vigorous PA – MET-min/week* Neuromuscular disease participants Carers or partners *Moderate PA – MET-min/week* Neuromuscular disease participants Carers or partners	 70.1 (361.9) 2081.8 (4945.3) 263.2 (606.9) 1153.3 (2424.6)	 37.1 (303.9) 861.9 (1662.9) 146.9 (450.6) 925.4 (3675.6)	 - 227.9 - 696.6 - 33 - 116.3	NR

	Walking – MET-min/week				
	Neuromuscular disease participants	547.7 (733.2)	211.9 (534)	- 2144.2	
	Carers or partners	1271.5 (2703.6)	2703.6 (574.9)	- 1448.4	
	Total PA – MET-min/week				
	Neuromuscular disease participants	901.3 (1299.6)	400.6 (1088.5)	- 149.3	
	Carers or partners	4506.5 (7600.1)	2362.3 (4498.9)	- 1219.9	
	MVPA – MET-min/week				
	Neuromuscular disease participants	333.3 (483.8)	184 (440.3)	- 335.8	
	Carers or partners	3235.7 (3684.7)	1787.3 (2669.3)	- 500.7	
Dogas et al (2020)	*Exercise frequency – per week*				
	All participants	2.8 (1.1)	2.6 (1.2)	- 0.2	< 0.001
	Males	2.8 (1.1)	2.7 (1.2)	- 0.1	0.453
	Females	2.8 (1.0)	2.7 (1.2)	- 0.1	0.001
	Exercise duration – minutes				
	All participants	57.9 (34.5)	51.1 (37.7)	- 6.8	< 0.001
	Males	61.2 (40.1)	59.2 (55.9)	- 2	> 0.999
	Females	55.6 (29.8)	49.2 (32.5)	- 6.4	< 0.001
Elran-Barak and Mozeikov (2020)	*PA – times/week*	3.5 (2.4)	2.8 (2.4)	- 0.7	< 0.001
Endstrasser et al (2020)	*Tegner Activity Score*	3	2	- 1	p = 0.046
Ernstsen et al (2020)	*Change in PA - % participants*	NR		NR	NR
	(All participants)				
	Reduced		13.8%		
	Unchanged		64.3%		
	Increased		21.9%		
	(Participants with anxiety disorder)				
	Reduced		25.2%		
	Unchanged		57.4%		
	Increased		17.4%		
	(Participants without anxiety disorder)				
	Reduced		12.7%		
	Unchanged		65.0%		
	Increased		22.3%		

	(Participants with depressive disorder) *Reduced* *Unchanged* *Increased* *(Participants without depressive disorder)* *Reduced* *Unchanged* *Increased*		 33.3% 62.7% 13.7% 13.0% 64.4% 22.2%		
Galle et al (2020a)	*Physical activity - % population* *Decreased* *Increased* *Active as before* *Inactive as before*	NR	 48.6% 21.3% 16.0% 14.1%	NR	NR
Galle et al (2020b)	*PA – min/day* *Total PA*[b] *Vigorous PA* *Moderate PA* *Walking*	 520 (820) 138.6 199.3 480.0	 270 (340) 108.3 148.1 144.5	 - 250 - 30.3 - 51.2 - 365.5	 NR < 0.05 < 0.05 < 0.05
Gallo et al (2020)	*Walking – min/day* All participants (compared with 2019) All participants (compared with 2018) Females (compared with 2019) Females (compared with 2018) *Vigorous PA – min/day* Males (compared with 2019) Males (compared with 2018)	NR	NR	 - 52.5 - 87.5 - 30 - 30 - 60.0 - 150	 < 0.05 < 0.001 < 0.05 0.068 < 0.05 < 0.001
Gilic et al (2020)	*PA – PAQ-A score* All participants Boys Girls	 2.98 (0.71) 3.12 (0.56) 2.69 (0.49)	 2.31 (0.68) 2.50 (0.44) 1.95 (0.56)	 - 0.67 - 0.62 - 0.74	 < 0.001 < 0.001 < 0.001
Giustino et al (2020)	*Physical Activity* *MET-min/week* *Number participants*	 3458.0	 1994.3	 - 1463.5	 p < 0.001

	Low Active *Moderately Active* *High Active*	49 352 401	200 409 193	+ 19% + 7% - 26%	NR
He et al (2020)	*Steps – per day* Males Females	 8321 (3000) 7038 (1923)	 3728 (1726) 3741 (1042)	 - 4593 - 3297	 < 0.001 < 0.001
Husain and Ashkanani (2020)	*PA hours per week - % participants* < 1h or none 1-2h per week 3-4h per week >4h per week	 48.9% 20.2% 14.7% 16.1%	 61.9% 18.1% 11.8% 8.2%	 + 13% - 2.1% - 2.9% - 7.9%	NR
Ingram et al (2020)	*Change in PA - % participants* A lot less A little less Same A little more A lot more	NR	NR	 24.8% 22.6% 16.8% 23.6% 12.3%	NR
Karuc et al (2020)	*MVPA – min/day*[b] Females Males *Change in PA - % participants* (Females) No change Increase Decrease (Males) No change Increase Decrease	 120 (227.1) 135 (127.5) NR NR	 64.3 (75) 85.7 (56.8) NR NR	 - 55.7 - 49.3 25% 19% 56% 31% 19% 50%	NR
Knell et al (2020)	*Change in PA - % participants* Increase Decrease Stay the same	NR	 25.2% 39.0% 35.8%	NR	NR
Kriaucioniene et al (2020)	*Change in PA - % participants* Increase Decrease	NR	 14.3% 60.6%	NR	NR

	Stay the same		19.3%		
Lopez-Bueno et al (2020a)	*PA – min/week*				
	All participants	221.9 (193.6)	176.7 (178.9)	- 45.2	< 0.001
	Males	268.8 (207.1)	196.0 (185.0)	- 72.8	< 0.001
	Females	182.0 (171.7)	160.4 (171.2)	- 21.6	< 0.001
	Age < 43 years old	238.4 (201.4)	196.4 (181.9)	- 42.0	< 0.001
	Age > 43 years old	182.4 (167.3)	129.6 (162.4)	- 52.8	< 0.001
	Married	210.1 (187.6)	161.4 (170.6)	- 48.7	< 0.001
	Not married	233.2 (198.8)	191.4 (185.5)	- 41.8	< 0.001
	Without University degree	217.2 (180.7)	181.3 (174.4)	- 35.9	< 0.001
	With University degree	221.9 (180.7)	168.8 (186.4)	- 53.1	< 0.001
	Employed	205.0 (180.0)	165.6 (168.7)	- 39.4	< 0.001
	Unemployed	251.0 (212.0)	195.6 (193.7)	- 55.4	< 0.001
Lopez-Bueno et al (2020b)	*PA < 150min/week - % participants*				
	1 week of lockdown	35.1%	52.2%	+ 17.1%	< 0.001*
	2 weeks of lockdown	35.1%	40.3%	+ 5.2%	
	3 weeks of lockdown	35.1%	26.2%	- 8.9%	
Mandelkorn et al (2020)	*Change in PA - % population*	NR		NR	NR
	(All Countries)				
	No Change		20.41%		
	More		17.84%		
	Less		61.75%		
	(USA only)				
	No change		29.76%		
	More		22.55%		
	Less		47.68%		
Maugeri et al (2020)	*PA – MET-min/week*			NR	
	Total PA	2429	- 852		< 0.001
	Vigorous PA	1109	- 342.4		< 0.001
	Moderate PA	574	- 50.7		0.0188
	Walking	746	- 458.4		< 0.001
	Total PA – MET-min/week				
	Males	2998	- 1244		< 0.001
	Female	1994	- 551		< 0.001
	Young (< 21 years old)	2726	- 874		< 0.001

	Young adults (21-40 years old) Adults (41-60 years old) Adults (≥ 60 years old)	2535 2150 2316	- 871 - 811 - 843		< 0.001 < 0.001 < 0.001
Meyer et al (2020)	*Weekly physical activity - % population* *Previously active* *Previously inactive*	NR	 -32.3% +2.3%	NR	NR
Mitra et al (2020)	*Walk or bike - % participants* (All participants) Decrease Same Increase (Children aged 5-11) Decrease Same Increase (Youth aged 12-17) Decrease Same Increase *PA or sport inside - % participants* (All participants) Decrease Same Increase (Children aged 5-11) Decrease Same Increase (Youth aged 12-17) Decrease Same Increase *PA or sport outside - % participants* (All participants) Decrease	NR	 53.2% 26.3% 20.5% 47.3% 25.0% 27.7% 58.4% 27.6% 14.0% 34.0% 40.5% 25.5% 27.1% 41.7% 31.2% 40.1% 39.4% 20.5% 63.8%	NR	NR

	Same		22.2%		
	Increase		14.0%		
	(Children aged 5-11)				
	Decrease		29.0%		
	Same		22.7%		
	Increase		18.3%		
	(Youth aged 12-17)				
	Decrease		68.0%		
	Same		21.8%		
	Increase		10.1%		
	Playing outside - % participants				
	(All participants)				
	Decrease		51.2%		
	Same		30.9%		
	Increase		17.9%		
	(Children aged 5-11)				
	Decrease		47.5%		
	Same		26.3%		
	Increase		26.3%		
	(Youth aged 12-17)				
	Decrease		54.6%		
	Same		35.0%		
	Increase		10.4%		
	Household chores - % participants				
	(All participants)				
	Decrease		8.2%		
	Same		53.9%		
	Increase		37.9%		
	(Children aged 5-11)				
	Decrease		7.2%		
	Same		53.2%		
	Increase		39.5%		
	(Youth aged 12-17)				
	Decrease		9.1%		

	Same Increase		54.4% 36.5%		
Mon-Lopez et al (2020a)	*Training days per week – frequency* All participants Males Females *Training – hours/week* All participants Males Females	 4.84 (1.15) 4.69 (1.2) 5.12 (1.0) 9.99 (3.8) 9.34 (3.63) 11.18 (3.83)	 4.23 (1.69) 3.98 (1.69) 4.68 (1.61) 5.27 (3.26) 4.89 (3.15) 5.97 (3.36)	 - 0.61 - 0.71 - 0.44 - 4.72 - 4.45 - 5.21	 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.003
Mon-Lopez et al (2020b)	*PA – METs* High intensity PA Moderate intensity PA Low intensity PA Total PA	 1660 (2714.55) 683.67 (130.95) 1427.53 (1852.27) 3771.19 (400.53)	 884.67 (1200.3) 464.33 (602.03) 1852.27 (274.73) 1623.73 (1658.85)	 - 775.33 - 219.34 - 1152.8 - 2147.46	 0.001 0.042 < 0.001 < 0.001
Munasinghe et al (2020)	*PA - (Yes-no)* Yes	 51.4%	 43.6%	 -7.8%	 NR
Muriel et al (2020)	*PA – hours/week* Total training Z1. Recovery Z2. Endurance Z3. Tempo Z4. Threshold Z5. VO2 max Z6. Anaerobic	 17.7 (3.6) 5.0 (1.9) 3.1 (1.0) 3.1 (1.0) 2.5 (0.7) 1.7 (0.6) 2.3 (1.1)	 11.7 (3.9) 2.4 (1.7) 3.5 (1.9) 2.3 (1.1) 1.4 (0.7) 1.0 (0.5) 1.1 (0.8)	 - 6.0 - 2.6 + 0.4 - 0.8 - 1.1 - 0.7 - 1.2	 < 0.001 < 0.001 0.378 < 0.001 < 0.001 < 0.001 < 0.001
Pellegrini et al (2020)	*Exercise - % participants* I never practice exercise Exercise is less than before quarantine Exercise is the same as before quarantine Exercise is more than before quarantine	NR	 32.6% 46.7% 10.0% 10.7%	NR	NR
Pietrobelli et al. (2020)	*Sports time* *Hours/week*	 3.6 (4.3)	 1.3 (1.4)	 - 2.30	 0.003
Pillay, L et al (2020)	*Training load and intensity decreased - % sample* *Yes* *No*	NR	 75% 25%	NR	NR

Robinson et al (2020)	*Exercise - % participants* A lot less Less A little less Same A little more More A lot more *PA (e.g. gardening) - % participants* A lot less Less A little less Same A little more More A lot more	NR	 11.0% 14.0% 15.0% 15.0% 20.0% 15.0% 10.0% 10.0% 12.0% 12.0% 21.0% 24.0% 16.0% 6.0%	NR	NR
Rogers et al (2020)	PA Change during lockdown - % participants Same Less More	NR	 63.9% 25.05% 11.06%	NR	<0.001
Romero-Blanco et al (2020)	*PA – days/week* Vigorous PA Moderate *PA – min/week* Vigorous PA Moderate PA Total PA	 0.98 (1.33) 1.74 (1.56) 28.47 (54.16) 42.81 (48.44) 223.3 (305.47)	 1.33 (2.19) 3.15 (2.05) 30.66 (30.94) 47.74 (50.8) 383.17 (438.9)	 + 1.12 + 1.41 + 2.19 + 4.93 + 159.87	 < 0.001 < 0.001 0.45 0.19 < 0.001
Ruiz-Ruso et al (2020a)	*Change in weekly PA*	NR	In text - 'During the COVID-19 lockdown, we noticed a significant increase in the daily hours that the participants of the study were sitting without doing any physical activity at all (Figure 5). Regarding the average minutes per week spent	NR	Mean walking time p=<0.0001 Mean time spent in moderate activity p=<0.05

			walking, we observed a significant decrease during lockdown compared to the period before.'		
Ruiz-Ruso et al (2020b)	*Change in PA levels - % participants* Active	 27.0%	 20.5%	 -6.5%	 NR
Sanchez-Sanchez et al (2020)	*Change in weekly PA - % participants* 1-3 times/week 4-5 times/week ≥ 6 times/week No PA	 35.4% 27.9% 7.9% 28.8%	 32.3% 23.7% 14.5% 29.4%	 - 3.1 - 4.2 + 6.6 + 0.6	NR
Sankar et al (2020)	*Change in PA - % participants* Increased Decreased Same	NR	 2.7% 14.5% 82.7%	NR	NR
Sanudo et al (2020)	*PA – min/week* Walking Moderate PA Vigorous PA MVPA *Steps – per day*	 362 (262) 411 (487) 256 (381) 797 (822) 8525 (3597)	 27 (47) 178 (155) 168 (228) 346 (341) 2754 (1724)	 - 335 - 263 - 88 - 451 - 5771	 < 0.01 0.028 0.006 0.006 < 0.001
Savage et al (2020)	*Moderate and vigorous PA*	NR	In text - PA decreased significantly over time (p<.010, however the effect size was trivial (d=0.12).	NR	< 0.01
Schlichtiger et al (2020a)	*Change in PA - % participants* Reduced PA Constant PA Increased PA	NR	 44.1% 22.6% 19.8%	NR	NR
Schlichtiger et al (2020b)	*PA – MET hours/week* Total PA Household PA Yard work Leisure activities Sports Work/volunteering	 168.8 (91.0) 52.2 (33.6) 14.5 (20.4) 20.0 (16.4) 40.6 (54.7) 41.6 (53.0)	 144.1 (84.8) 50.5 (31.8) 16.4 (22.3) 16.4 (15.9) 27.6 (35.7) 33.1 (52.1)	 - 24.7 - 1.7 + 1.9 - 3.6 - 13 - 8.5	 < 0.01 0.102 0.038 0.014 0.001 < 0.001

Srivastav et al (2020)	*PA – MET-min/week*				
	Vigorous PA	2727.3	1165.2	- 1562.1	< 0.001
	Moderate PA	1994.3	728.2	- 1266.1	< 0.001
	Walking	3088.3	2242.3	- 845.9	< 0.001
	Total PA	8142.7	5390.9	- 2751.8	< 0.001
	Total PA without sitting	7809.7	4135.7	- 3674.0	< 0.001
Vetrovsky et al (2020)	*Changes in steps - % participants*	NR	NR	- 16.2%	< 0.001
Wang et al (2020)	*Exercise - % participants*	NR		NR	NR
	Reduced		52%		
	Increased		17%		
	Daily PA - % participants				
	Reduced		44%		
	Increased		19%		
Yang et al (2020a)[b]	*Active transport – hours/day*				
	High School Students (< 18 years old)	1.5	1.0	- 0.5	< 0.05
	Undergraduate Students	1.3	1.0	- 0.3	< 0.001
	Graduate students	1.0	0.5	- 0.5	< 0.05
	All participants	1.3	1.0	- 0.3	< 0.05
	Housework activity – hours/day				
	High School Students (< 18 years old)	2.0	2.3	+ 0.3	< 0.001
	Undergraduate Students	1.5	2.0	+ 0.5	< 0.001
	Graduate students	1.0	1.1	+ 0.1	> 0.05
	All participants	2.0	2.0	0	< 0.05
	MVPA – hours/day				
	High School Students (< 18 years old)	1.5	1.5	0	< 0.05
	Undergraduate Students	1.1	1.0	-0.1	< 0.05
	Graduate students	1.0	1.0	0	> 0.05
	All participants	1.3	1.2	-0.1	< 0.001
	Walking for leisure – hours/day				
	High School Students (< 18 years old)	1.0	1.0	0	< 0.01
	Undergraduate Students	1.0	0.8	- 0.2	< 0.001
	Graduate students	1.0	1.0	0	> 0.05
	All participants	1.0	1.0	0	< 0.001
Yang et al (2020b)	*PA – MET-min/week*				

	Total PA	3323 (2451)	2718 (2205)	- 605	< 0.001
	PA – min/day				
	Moderate PA	57.15 (42.67)	46.77 (41.37)	- 10.38	< 0.01
	Vigorous PA	47.94 (41.91)	39.47 (40.0)	- 8.47	< 0.001
	Active PA	157.8 (92.73)	134.45 (90. 89)	- 23.35	0.003
	Walking	52.71 (47.7)	48.21 (44.41)	- 4.5	0.067
Zenic et al (2020)	*Change in PA – PAQ-A Score*				
	All participants	2.97 (0.61)	2.63 (0.68)	- 0.34	< 0.01

NR, Not reported; MVPA, moderate-to-vigorous physical activity; METs, Metabolic Equivalent Tasks

[a] Numeric data provided by authors via email, from figure 2 in original manuscript.

[b] Data reported as median (interquartile range)

[c] Data reported as mean (standard error)

* between groups

Supplementary Table 6. Sedentary behaviour pre- and during lockdown

Author	SB type and units of measurement	SB Pre-lockdown Mean (SD)	SB During lockdown Mean (SD)	Change	P value (if applicable)
Ammar et al. (2020)	*Sitting time* Hours/Day	5.3 (3.65)	8.41 (5.11)	+ 28.6%	p < 0.001
Asiamah et al (2020)	*Sedentary behaviour - % participants* No time added/week 1-30 min added/week 30-59 min added/week 1-3hrs added/week 4-6hrs added/week >6hrs added/week	NR	 18.4% 5.6% 7.9% 24.6% 24.2% 19.3%	NR	NR
Bivi-Roig et al (2020) [b]	*Sitting time* Hours/Day	4 (4)	8 (5)	+ 4	p < 0.001
Castaneda-Babarro Coca et al (2020)	*Sitting time (hours/day)* All participants Women Men Workers Students Study-work Nothing (age categories) 18-24 years old 25-34 years old 35-44 years old 45-54 years old 55-65 years old (Moderate PA categories) 0-150 min/week	 6.1 (3.6) 6.3 (3.9) 6.0 (3.1) 6.2 (3.5) 6.4 (2.4) 6.3 (4.1) 4.4 (2.4) 6.6 (4.2) 6.4 (3.1) 6.0 (3.9) 6.1 (3.1) 5.7 (3.0) 6.4 (3.6) 5.7 (3) 5.7 (4.4)	 8 (5.1) 7.9 (3.9) 8.1 (5.9) 8.0 (5.4) 8.8 (3.2) 8.3 (3.4) 6.5 (3.5) 9 (3.5) 8.6 (3.6) 7.7 (3.9) 7.9 (7.2) 7.5 (3.5) 8.2 (4.3) 8.1 (7.3) 7.6 (3.3)	 + 1.9 + 1.6 + 2.1 +1.8 +2.4 +2.0 +2.1 + 2.4 + 2.2 + 1.7 + 1.8 + 1.8 + 1.8 + 2.4 + 1.9	 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001

	150-300 min/week 300-450 min/week >450 min/week (Vigorous PA categories) 0-75 min/week 75-150 min/week 150-225 min/week >225 min/week	4.8 (2.9) 6.4 (3.2) 6.5 (4.3) 6.2 (3.1) 5.7 (3.3)	6.5 (3.3) 7.9 (3.5) 8.0 (3.5) 8.2 (4.1) 8.0 (6.5)	+ 1.7 + 1.5 + 1.5 + 2.0 +2.3	< 0.001 < 0.001 < 0.001 < 0.001 < 0.001
Constandt et al (2020a)	*Screen watching - % participants* Decreased Unchanged Increased	NR	NR	 3.6% 37% 59.0%	NR
Constandt et al. (2020b)	 *Sitting time - % of participants (active group)* Increased Stayed the same Decreased *Sitting time - % of participants (inactive group)* Increased Stayed the same Decreased	NR	NR	 46% 39% 15% 40% 36% 24%	NR
Dutta et al (2020)	*Phone screen time weekday - % participants* < 1 hour per day 1-2 hours per day 2-4 hours per day 4-8 hours per day Not applicable *Phone screen time weekend day - % participants* < 1 hour per day 1-2 hours per day 2-4 hours per day 4-8 hours per day Not applicable *Laptop screen time weekday - % participants* < 1 hour per day	 28.6% 25.7% 11.4% 5.7% 28.6% 31.4% 20.0% 17.1% 2.9% 28.6% 25.7%	 28.6% 22.9% 11.4% 14.3% 22.9% 28.6% 22.9% 11.4% 14.3% 22.9% 17.1%	 0 - 2.8 0 + 8.6 - 5.7 - 2.8 + 2.9 - 5.7 + 11.4 - 5.7 - 8.6	NR

	1-2 hours per day	8.6%	17.1%	+ 8.5	
	2-4 hours per day	5.7%	8.6%	+ 2.9	
	4-8 hours per day	5.8%	8.6%	+ 2.8	
	Not applicable	54.3%	48.6%		
	Laptop screen time weekend day - % participants				
	< 1 hour per day	17.1%	17.1%	0	
	1-2 hours per day	14.3%	17.1%	+ 2.8	
	2-4 hours per day	2.9%	8.6%	+ 5.7	
	4-8 hours per day	2.9%	8.6%	+ 5.7	
	Not applicable	62.9%	48.6%	- 14.3	
	TV screen time weekday - % participants				
	< 1 hour per day	34.3%	20.0%	- 14.3	
	1-2 hours per day	31.4%	25.8%	- 5.3	
	2-4 hours per day	0%	20.0%	+ 20	
	4-8 hours per day	2.9%	8.6%	+ 5.7	
	Not applicable	31.4%	25.7%	- 5.7	
	TV screen time weekend day - % participants				
	< 1 hour per day	22.9%	20.0%	- 2.9	
	1-2 hours per day	40.0%	25.8%	- 14.2	
	2-4 hours per day	5.7%	20.0%	+ 14.3	
	4-8 hours per day	2.9%	8.6%	+ 5.7	
	Not applicable	28.6%	25.7%	- 2.9	
	Tablet screen time weekday - % participants				
	< 1 hour per day	25.7%	22.9%	- 2.8	
	1-2 hours per day	0%	2.9%	+ 2.9	
	2-4 hours per day	0%	0%	0	
	4-8 hours per day	2.9%	2.9%	0	
	Not applicable	71.4%	71.4%	0	
	Tablet screen time weekend day - % participants				
	< 1 hour per day	20.0%	22.9%	+ 2.9	
	1-2 hours per day	5.7%	2.9%	- 2.8	
	2-4 hours per day	0%	0%	0	
	4-8 hours per day	0%	2.9%	+ 2.9	
	Not applicable	74.3%	71.4%	- 2.9	

Elran-Barak and Mozeikov (2020)	*Social media – hours/day*	3.2 (1.1)	3.9 (1.2)	+ 0.7	< 0.001
	Online health communities – hours/day	2 (0.7)	2.2 (0.9)	+ 0.2	< 0.001
Galle et al (2020b)	*Sedentary time – min/day*				
	Total[b]	240 (240)	480 (300)	+ 240	NR
	Sedentary leisure activities	38.7	66.6	+ 27.9	< 0.05
	Using electronic devices	65.3	177.7	+ 52.4	< 0.05
	Watching TV/DVD	71.7	119.3	+ 47.6	< 0.05
	Eating	82.3	106.5	+ 24.2	< 0.05
	Studying/working	173.9	210.7	+ 36.8	< 0.05
Husain and Ashkanani (2020)	*Hours per day spent on computer/TV/mobile - % participants*				NR
	1-2h per day				
	3-4h per day	30.4%	12.0%	- 18.4%	
	5-6h per day	33.3%	19.0%	- 14.3%	
	>6h per day	30.2%	25.3%	+ 5.1%	
		16.1%	43.6%	+ 27.5%	
Lopez-Bueno et al (2020b)	*Screen time ≥2h/day - % participants*				
	1 week of lockdown	83.3%	97.7%	+ 14.7%	< 0.001*
	2 weeks of lockdown	83.3%	96.9%	+ 13.9%	
	3 weeks of lockdown	83.3%	98.7%	+ 15.7%	
Majumdar et al (2020)	*Change in screen time on cell phone – hours/day*				NR
	Office workers				
	Students	3 (1.59)	4 (2.24)	+ 1.0	
		3 (1.36)	5.2 (1.73)	+ 2.2	
	Change in screen time on computer – hours/day				
	Office workers				
	Students				
		6.4 (2.9)	8.2 (3.36)	+ 1.8	
	Change in screen time TV – hours/day	1.3 (0.95)	1.6 (1.75)	+ 0.3	
	Office workers				
	Students				
		0.7 (0.09)	1.5 (1.32)	+ 0.8	
		1.1 (0.35)	1.3 (1.02)	+ 0.2	
Meyer et al. (2020)	*Sitting time - % of population*	NR	NR		NR
	Previously active			+26.4%	
	Previously inactive			+16.0%	
	Screen time - % of population				

	Previously active *Previously inactive*			+37.8% +25.3%	
Mitra et al (2020)	*Screen time - % participants* (All participants) Decrease Same Increase (Children aged 5-11) Decrease Same Increase (Youth aged 12-17) Decrease Same Increase *Non-screen sedentary time - % participants* (All participants) Decrease Same Increase (Children aged 5-11) Decrease Same Increase (Youth aged 12-17) Decrease Same Increase	NR	NR	 3.7% 17.5% 78.8% 3.8% 18.3% 77.9% 3.6% 16.9% 79.5% 7.2% 44.2% 48.6% 6.8% 35.5% 57.7% 7.6% 51.9% 40.6%	NR
Mon-Lopez et al (2020b)	*Screen time – min/day* TV time PC time Phone time Total screen time	 79.54 (69.11) 206.69 (170.33) 149.41 (123.29) 433.29 (225.66)	 152.88 (126.98) 265.97 (197.84) 205.92 (162.18) 326.97 (319.79)	 + 73.34 + 59.28 + 56.51 + 190.68	 < 0.001 < 0.001 < 0.001 < 0.001

Munasinghe et al (2020)	*Watching TV - Yes/No* Watched TV	55.4%	52.1%	- 3.3%	NR
Pietrobelli et al. (2020)	*Screen time* *Hours/day*	2.76 (1.64)	7.61 (2.13)	+ 4.85 (2.40)	p < 0.001
Robinson et al (2020)	*Time spent sitting down - % participants* A lot less Less A little less Same A little more More A lot more	NR	NR	 1.0% 2.0% 5.0% 20.0% 20.0% 28.0% 25.0%	NR
Romero-Blanco et al (2020)	*Daily sitting time* Min/day	418.59 (201.58)	525.35 (194.57)	+ 106.76	< 0.001
Ruiz-Roso et al (2020a)	*Sitting time*	NR	In text - 'During the COVID-19 lockdown, we noticed a significant increase in the daily hours that the participants of the study were sitting without doing any physical activity at all (Figure 5). Regarding the average minutes per week spent walking, we observed a significant decrease during lockdown compared to the period before.'	NR	<0.0001
Sanudo et al (2020)	*Sitting time* Hours/day	6.4 (2.6)	9.7 (2.9)	+ 3.3	0.002

Savage et al (2020)	*Sedentary behaviour*	NR	In text - 'Sedentary behaviour was greater at T4 compared to T1, T2 and T3 (Bonferroni post hoc test, P < .0001), and was greater at T3 compared to T1 (P < .0001).'	NR	NR
Srivastav et al (2020)	*SB – MET-min/week* Sitting	332.9	1255.3	+ 922.4	< 0.001
Yang et al (2020a)[b]	*Screen time – hours/day* High School Students (< 18 years old) Undergraduate Students Graduate students All participants *Sedentary time on weekdays – hours/day* High School Students (< 18 years old) Undergraduate Students Graduate students All participants *Sedentary time on weekend days – hours/day* High School Students (< 18 years old) Undergraduate Students Graduate students All participants	 4.0 4.0 5.0 4.0 3.3 4.0 6.0 4.0 3.4 4.0 5.0 4.0	 5.0 5.0 5.0 5.0 4.0 5.0 6.0 4.5 4.0 5.0 6.0 4.5	 + 1 + 1 0 + 1 + 0.7 + 1 0 + 0.5 + 0.6 + 1.0 + 1.0 + 0.5	 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.01 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001
Yang et al (2020b)	*Sedentary time* Min/day	367.99 (167.01)	369.55 (152.85)	+ 1.56	0.85
Wang et al (2020)	*Sitting time increased* % participants *Lying down time increased* % participants	NR	NR	 67% 61%	NR

NR, Not reported; TV, television; DVD, digital video disc;

[b] Data reported as median (interquartile range)

* between groups